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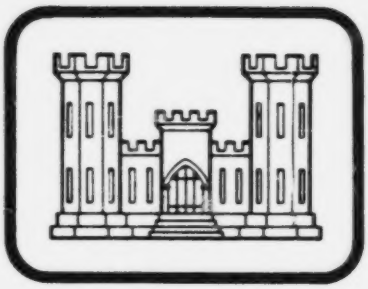


United States Army Corps of Engineers

...Serving the Army
...Serving the Nation

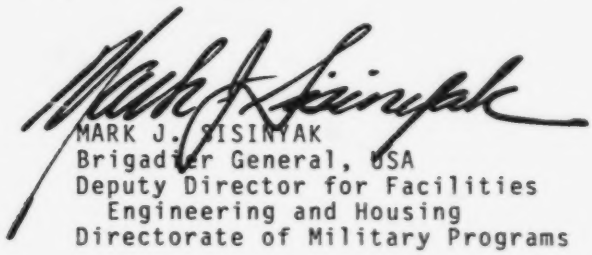
CORPS OF ENGINEERS SUPPORT SERVICES CATALOG

253

FOREWORD

This "Catalog of Services" provides a compilation of specialized Corps of Engineers capabilities. The catalog is designed primarily to satisfy the potential needs of Army Facilities and MACOM Engineers but should also be of value to any US Government agencies seeking resolution of technical engineering-related problems.

The catalog outlines what services are available, where and how they may be obtained, and lists specific consultants recognized as authorities in the specialty area of interest. It is the first known complete Corps-wide listing of this sort. Our search for coverage of engineer services was extensive; however, if some capability or source was inadvertently omitted, please bring it to the attention of the Commander and Director, US Army Facilities Engineering Support Agency, at AUTOVON 354-5221 or Commercial (703) 664-5221.



MARK J. SISINYAK
Brigadier General, USA
Deputy Director for Facilities
Engineering and Housing
Directorate of Military Programs

"HOW TO SECTION"

This "How To Section" guides the reader on how to use this selected reference catalog, listing the major categories of services, the specific technical topics and a listing of consultants available to the FE from the wealth of COE resources.

1. The Corps of Engineers Support Services Program identifies and categorizes several services available to the FE. These include:

- ENGINEERING SERVICES
- TECHNICAL SERVICES
- CONSTRUCTION SERVICES
- SPECIAL STUDIES & SURVEYS
- UTILITY SERVICES
- EMERGENCY SERVICES
- ADMINISTRATIVE SERVICES
- INSTALLATION PROJECT
- FINANCIAL MANAGEMENT

2. This catalog is indexed such that each Corps of Engineers Support Service is identified in a "Section". Within each Section are found specific problem areas or topics in which highly specialized technical help is offered by either a COE Laboratory or Agency.

3. To use this catalog the reader, after locating the topic in the index, will note the following information:

- LABORATORY OR AGENCY - the specific offering support.
- DESCRIPTION - a definition of the topic area.
- WORK NORMALLY PERFORMED - lists what the individual laboratory or agency will do to help resolve the problem.
- SUPPORT PLANNING INFORMATION - provides the necessary information as to what Installation (FE) support is needed for the laboratory or agency to initiate and complete the necessary

work efforts.
* (See note)

- POINT OF CONTACT - responsible individual at the laboratory or agency who can provide further information and/or commit resources.

4. If along with the topic area, the laboratory or agency that provides the support, a specific consultant for the topic may be located in the "LISTING OF TECHNICAL CONSULTANTS" in the rear of the catalog. In this section the consultant's name, address, organization and telephone number can be found. The consultant may be directly contacted for a quick and efficient response to the FE's inquiries and/or needs.

* Note: For instances throughout the catalog where no support planning information is listed the following procedure applies:

1. SUPPORT PLANNING INFORMATION: Since you would be calling on a laboratory because of difficult and unusual problems, it is rather important to provide them with all technical information you have on the subject. An introductory telephone call usually will help define the actual needs. Such supporting information as sketches, as-built drawings, photographs, specifications and any other documentation available will usually provide a data base from which meaningful advice can be generated.

2. In some instances a visit to the problem area may be warranted and on-site measurements may be required. If a site visit is made some support probably will be required from your organization. This may be as simple as arranging for access to the area (at night in some instances) and showing the specific problem or as complex as assisting in the installation of instrumentation, reading data periodically from that instrumentation and transmitting the results to the lab.

3. Obviously the nature of the physical and fiscal support needed depends on the degree and complexity of lab involvement you require and the scope of the investigation.

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ENGINEERING SERVICES

WES

GUIDANCE AND CRITERIA FOR DESIGNING SEISMIC - AND SHOCK-RESISTANT STRUCTURES

Description

State-of-the-Art methods will be provided for designing and analyzing various types of structures to resist the effects of earthquakes and man-initiated disturbances such as from explosions. The capability to assist in the design of structures hardened to resist the effects of conventional and nuclear weapons is available also.

Work Normally Performed By WES

The WES will provide a team of engineers and scientists to define quantitatively the various inputs loading conditions caused by seismic disturbances or by explosions, convert those effects to applied loads which the structure must resist, and determine the structural response and the effects of internal shock on people and equipment.

Support Planning Information

For WES to accomplish analysis studies to support the design of new facilities, the customer should provide overall sizing (dimensions) of the structure, should define threat conditions which the structure must safely resist in order to meet operational requirements, and should provide appropriate site descriptions. For the analysis of existing facilities, the customer should furnish as-built drawings or other data that serves to define structural characteristics, site conditions, and backfill materials.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES EXPLOSION EFFECTS ADVICE

Description

Corps of Engineers districts frequently are involved in operations involving use of explosives. Examples include controlled blasting in rock and permafrost for excavation purposes, ditching in soil for drainage purposes, and various demolition and salvage operations. Explosions in lakes, streams and harbors are often necessary as well as in soil, rock, ice and on various engineering structures. In most situations, detailed consideration of the explosion effects (blast, shock, cratering, etc.) is necessary for safety and environmental control purposes.

Work Normally Performed By WES

Although the Waterways Experiment Station is considered to be a research organization, valuable consultation services may be provided to support both civil works as well as military engineering operations of the Army Engineers. In unusual situations, such as emergencies caused by floods or natural disasters, resources including materials and people can be made available to perform blasting operations as well as consultation. Examples of the types of services available are:

a. Prediction of airblast, water shock, ground shock, crater sizes, and debris distribution for explosions in different materials and configurations.

b. Recommendations for safe limits for blasting operations in terms of explosive quantities, stand-off distances, etc., to preclude damage to houses and other structures.

c. Instructions in the use of explosives for controlled blasting operations, i.e., charge firing patterns, quantities and delay periods.

d. In emergencies, teams of experts to plan, conduct or direct explosive operations.

e. Review of contractor blasting/demolition plans.

Support Planning Information

A. It is recommended that consultation with WES be held at the outset of planning explosive operations, especially those involving private contractor services.

B. Information provided to WES should be detailed enough to make the required technical assessments.

C. Since WES operates on a reimbursable basis, funds should be provided to them for services requiring more than one man-day of effort and incidental expenses.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

DUST CONTROL

Description

Research has been conducted to develop a dust control system capable of providing the military with an effective and efficient means of suppressing dust at airfields, helipads, and operational bases, and on roads where the presence of dust is detrimental to military operations. A number of materials have been studied, and a polyvinyl acetate emulsion (PVA) has been developed in combination with fiber glass that is capable of controlling surface blast from the CH 47 helicopters or C-130 aircraft. These materials increase capabilities for sustained air and traffic operations, reduce health and safety hazards, and enhance security by eliminating dust cloud signatures.

Work Normally Performed By WES

The GL provides the technical research personnel and testing facilities to conduct the necessary investigations which lead to the final guidance document for dust control.

Support Planning Information

User problems/requirements must be made known to OCE FE and priorities established regarding need for study.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

SOIL MECHANICS AND FOUNDATION ENGINEERING

Description

Maintains a viable capability to provide design and construction guidance, analysis, evaluation, technical and engineering training, and consulting services in the fields of soil mechanics, soil structure interaction, foundation engineering and related geotechnical support for both permanent and short-use expedient installations.

Work Normally Performed By WES

Conducts field and laboratory investigations for design and construction for foundations of structures. Plans site exploration and subsurface investigation, field installations and tests to determine in situ soil and seepage conditions and to obtain special soil samples, unusual or difficult installations of piezometers or other subsurface observational equipment, all of which involve the design and/or development of experimental or special purpose equipment. Provides soils laboratory services. Conceives and conducts laboratory research of a fundamental nature on the physical properties of soil and soft rock, investigating, evaluating, and developing test apparatus and procedures for performing laboratory tests of embankment and foundation materials to determine optimum methods for design with respect to adequacy of results and cost. Conducts research in the field of soil mechanics and foundation engineering. Utilizes complex analytical procedures of finite element difference techniques in analyses of stresses, deformations, and stability of soil masses applicable to slope, embankment, foundations, and soil-structure interaction problems maintaining a continuing developmental program with these and other new computer programs.

Furnishes consultant services on soil mechanics and foundation engineering for both civil and military problems encountered in design and construction. Prepares reports, bulletins, engineer manuals, technical material specifications, and technical papers on soil mechanics and foundation engineering and related topics. Conducts training courses for earthwork inspection, design and construction of earth and rock-fill dams, and specialized

topics in soil mechanics and foundation engineering such as seepage control, instrumentation, finite element analyses, pile foundations, soil laboratory practices, and advanced research developments in soil mechanics and foundation engineering.

Support Planning Information

The studies, investigations, field and laboratory support, and consultant services are provided on a reimbursable basis. Nominal requests for telephonic advice or information are handled gratis.

User problems/requirements must be made known to WES/GL/SMD and the priority established for requirements and needs for the studies, including dates required and funds available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

DESIGN AND OPERATIONAL PLANNING FOR NON-TYPICAL WASTE TREATMENT SYSTEMS

Description

Some sewage/waste treatment plants because of the unique character of the influent or their size or situation present unusual design problems. These plants may, for example, have irregular loading schedules, or have unusual discharge requirements to meet or may be required to handle non-typical wastes. The Waterways Experiment Station can provide a team of engineers and technicians to survey waste treatment needs and recommend design approaches that will meet discharge requirements.

Work Normally Performed By WES

WES can provide trained engineers and technicians to establish the nature of the influent for a proposed or existing sewage treatment system and conduct treatability studies to determine the effectiveness of various unit operations on the effluent quality. The results of these studies will be used in producing preliminary designs.

Support Planning Information

A. Any documentation pertaining to the waste stream to be treated should be available for inspection.

B. Documents pertaining to economic, site or environmental constraints should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES METHODOLOGY FOR AREA - WIDE PLANNING SYSTEMS (MAPS)

Description

A computer-based program has been conceived and developed by the WES that can be used for assistance in area-wide planning where water supply, water transmission and wastewater treatment and other pollution abatement systems must be integrated in a regional (installation-wide) approach.

Work Normally Performed By WES

WES periodically conducts training courses in the use of MAPS and can supply a team of engineers and scientists to develop an area-wide plan for a specific installation.

Support Planning Information

The information required should include but may not be limited to the following:

A. The duration of the planning period.

B. The time intervals that should be considered i.e. the scenarios at 5, 10, 20, or 50 years in the future.

C. Development plans to include alternatives for facilities and land use.

D. Environmental data base to include:
   (1) Water quality and quanity water sources.
   (2) Waste stream characterization.
   (3) Solid waste disposal practice and areas.
   (4) All known sources of contamination.
   (5) Any planning constraints, legal or otherwise.

Where data similar to that mentioned in subpargraph D is not available assistance can be given to develop a plan for obtaining it and presenting it in the proper format.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

ECOSYSTEM MODELING (PHYSICAL AND MATHEMATICAL)

Description

The EL has developed the capability for preparing physical and mathematical models of ecosystems for large and small scale ecosystems for the purpose of predicting the effects of natural and man-induced perturbations on environmental quality.

Many complex environmental problems can only be understood by resolving the problem into component parts in a modeling operation. EL has broad capabilities in modeling for the prediction of water-quality and ecologic consequences of military activities. These approaches can be easily applied to activities on military installations to allow the consequences of particular construction programs to be assessed before the activity is actually undertaken.

Work Normally Performed By WES

WES can apply, and develop when necessary mathematical and physical systems for use in analyses of complex environmental problems that require environmental modeling (e.g., conducting bioassays to determine the extent of biomagnification of pollutants in a food chain and predicting pollution migration in the enchancement).

Support Planning Information

A. Environmental data base includes quantification of all parameters to be considered in the modeling effort.

B. The time frame(s) of interest.

C. Planned activities that will impact the parameters (quantity and quality) being considered in conjunction with the program.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

COMPUTER AIDED PROCEDURES FOR DESIGN AND EVALUATION OF WASTEWATER TREATMENT SYSTEMS (CAPDET)

Description

The EL originated and developed a Computer-Aided Procedure for the Design and Evaluation of wastewater Treatment systems (CAPDET). The CAPDET program is of great use in designing and cost estimating wastewater treatment systems and treatment alternatives with respect to cost effectiveness and effluent quality. The program allows the user to rapidly evaluate the effectiveness of recommended treatment systems and their estimated construction and operation and maintenance costs.

Work Normally Performed By WES

WES can provide training for Facilities Engineer District personnel and support contractors in their regular scheduled training courses or on an ad hoc basis. Additionally they can operate the model to obtain preliminary design and cost data for specific projects.

Support Planning Information

The information required from the sponsor will normally include the following:

A. Definition of the waste stream or streams.

B. Level of treatment required.

C. Permit requirement.

D. Description of sites and alternative sites as appropriate.

E. When A through D are not available, EL personnel can work with the sponsor to obtain the information.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

CRREL

DESIGN AND MAINTENANCE OF ROADS AND AIRFIELDS

Description

Completion studies have resulted in the development of design and construction criteria for asphalt-cement concrete paving operations at low temperatures (even below freezing), the design of asphalt pavements using special asphalt cements (e.g. AC 2.5), the design of pavements using special temperature insulation materials (e.g. polystyrene), the use of membrane encapsulation of frost susceptible soils in roads and airfields, the minimizing of reflection cracking using fabrics and thick overlays, and the design of "full-depth" asphalt concrete pavements on frost susceptible subgrades.

The capabilities exist to perform NDT (Non-destructive testing) of flexible pavements by repeated load plate bearing testing for comparative strength measurements caused by seasonal, as well as life-cycle variations.

A minimal past effort in pothole repair has been augmented this fiscal year because of the high costs of pavement maintenance following the severe winters of the past two years.

Work Normally Performed By CRREL

CRREL will provide consultation services by research engineers and, whenever possible, will assist in the design, construction and testing of specialty pavements and materials for pavement maintenance.

Support Planning Information

A. Problem definition and work scope.

B. Transportation of equipment and materials.

C. Access to work areas.

Point of Contact

Commander/Director
U.S. Army Corps of Engineers
Cold Regions Research and Engineering
Laboratory
P. O. Box 282
Hanover, NH 03755

CERL

AIR POLLUTION CONTROL SYSTEMS

Description

Assistance in the planning, programming, design review and O & M of air pollution control systems and assistance in the control of fugitive dusts.

Work Normally Performed By CERL

CERL staff can assist installation and MACOM engineers in the following areas:

1. Point Source Control:
   a. Technology selection
   b. 1391 preparation/cost estimation
   c. Design review
   d. Material selection
   e. Fluid flow/flue gas calculations
   f. O & M manual preparation/supplementation
   g. Residue disposal technology

2. Fugitive Dust Control:
   a. Problem magnitude assessment
   b. Analysis of alternative control strategies
   c. Evaluation of dust control materials
   d. Cost Estimation
   e. Application schedule preparation

Support Planning Information

1. Point Source:
   a. Any permits, compliance orders between installation and regulatory agency
   b. Flue gas analysis
   c. Particulate size analysis
   d. Installation maps/drawings

2. Fugitive Dust:
   a. Wind rose data
   b. Airshed data (status of compliance)

c. Major dust producing activities
d. Background particulate data
e. Proximity of off-post receptors
f. Topographic data

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

SOLID/HAZARDOUS WASTE MANAGEMENT

Description

CERL can provide assistance in planning, and improving solid waste collection, storage, transportation and disposal. Additionally, CERL can provide assistance in leachate control and in compliance with hazardous waste provisions of the Resource Conservation and Recovery Act (RCRA).

Work Normally Performed By CERL

1. Solid Waste Management: Engineers in CERL's Environmental Division have experimented in and can provide services for:

a. Collection route contract preparation
b. Collection route improvement
c. Container size recommendation
d. Solid waste quantification and characterization
e. Recycle/resource recovery
f. Landfill design review
g. Landfill compactor equipment
h. Leachate minimization
i. Leachate interception and treatment
j. RCRA compliance

2. Hazardous Waste Management:

a. Assistance in conducting survey to characterize hazardous waste stream
b. Assistance in application of manifest system
c. Design review of hazardous waste storage facilities
d. Evaluation of alternate disposal strategies

Support Planning Information

1. Solid Waste Management:

a. Installation maps

b. Housing and tenacy information
c. Tenant activity missions
d. Collection route information (if improvement is desired)
e. Landfill site map
f. PX, commissary, club, sales information (recycle/resource recovery)

2. Hazardous Waste:

a. Installation maps
b. Installation and tenant agency missions
c. Access to procurement/supply information
d. POC's in each major activity and tenant agency
e. Location of nearest licensed hazardous waste disposal facility (if known)

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL NOISE IMPACT PREDICTION

Description

CERL has the capability to predict the noise impact resulting from the totality of a facility's operations. Specifically, CERL can predict the noise impact resulting from the toatality of blast operations (armor, artillery, demolition, quarry, etc.), fixed wing air operations, including small aircraft (Army), and large aircraft (Navy, Air Force), small arms, rotary wing aircraft, mobile sources and fixed sources. These predictions are in the form of computer-generated equal "noiseness" contours in accordance with established procedures of the National Academy of Science, EPA and DOD. These contours are based upon operational data supplied by the facility.

Work Normally Performed By CERL

A. CERL will describe the operational data required for input into the computer contour generation program and, if necessary, meet with and direct the preparation of this operational data.

B. CERL will inspect and validate the operational data supplied.

C. CERL will supervise the keypunching and verification of the operational data, its installation into the computer, and the running of the noise contouring computer programs.

D. CERL will check the resulting output, having necessary transparent overlays produced, and distribute the resulting noise contours.

E. CERL will consult and assist with interpretation and use of the noise contours.

Support Planning Information

Operational data are required to predict noise contours. Typically, these must be gathered from such sources as range safety cards, airfield operations logs, tower personnel, etc. Various CERL reports define in detail the data and its sources for the various noise source categories.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL ARCHITECTURAL ACOUSTICS

Description

Consultative assistance with the design of new construction and major renovation of existing construction such as to improve the acoustical environment within the structure either owning to internally generated noise sources or to better shield occupants and equipment from externally generated noise sources.

Work Normally Performed By CERL

CERL will provide a senior engineer to assist with the design of appropriate acoustical specifications and list appropriate standard measurements to test for quality assurance. CERL can perform the quality testing. The general categories of architectural design include such types of spaces as:

a. Barracks

b. Offices

c. Shop areas

d. Confinement facilities

e. Dining facilities

f. Medical and health care facilities

Support Planning Information

There should be a complete description of the project and its proposed design available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL NOISE IMPACT MITIGATION

Description

Consultative assistance in the design, construction or use of the full range of noise mitigation techniques available to Army facilities. These include techniques which quiet the source or otherwise alter it, inhibit the propagation of sound from source to receiver, or alter or transform the receiver such that noise is no longer a problem. Specific measures, for example, might be relocation of firing points, addition of barriers, addition of mufflers, use of foam techniques o quiet explosives, land use alternatives, etc.

Work Normally Performed By CERL

CERL will provide a senior engineer to assist the facility engineer and appropriate base personnel (range officer, airfield operations, G-3, etc.) in developing methods and procedures to mitigate noise. A partial listing of mitigation methods includes:

a. Operational changes, such as relocated firing points.

b. Process substitution, such as the use of subcaliber rounds and inert rounds.

c. Muffling devices.

d. Sound suppressants for explosives.

e. Land use strategies.

Support Planning Information

A definite statement of the problem should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

DESIGN, CONSTRUCTION, AND O & M DEFICENCY REPORTING AND ANALYSIS

Description

Full text retrieval system which store deficiency report descriptors and text. Search can be performed on any word or combination of words. Interactive text entry and searching can be done on any of the ubiquitous, inexpensive ($<1000) ASCII keyboard/printer portable computer terminals, using dial-up telephone for communication with the computer. Text entry will normally be at installations. Searching can be performed at installations and MACOM's. User training and skill requirements are negligible.

Work Normally Performed By CERL

A commercial text entry and search routine has been procured and adapted by CERL for FE use. Time and cost requirements are minimal.

Support Planning Information

Several representatives must meet with CERL for one day to plan input/output format. A later review meeting will be required upon work completion.

Point of Contact

Associate Technical Director
US Army Corps of Engineers
Constructionn Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820
Cml 217-352-6511, Ext 207 or FTS 958-7207

CERL

SUPPORT MANAGEMENT ENGINEERING

Description

The Computer Aided Engineering and Architectural Design System (CAEADS) has some applications which can be used directly by FE's and some applications which need to be down-sized or simplified to be practical for FE short run use with computer hardware limited to inexpensive ($<1000) ASCII keyboard/printers which will be possessed by all installations. Work is required to downsize routines such as SEARCH, Systematic Evaluation of Habitability. Other routines, such as those specifications preparation and cost estimating, will require some simplification to provide benefits consistant with reasonable FE capabilities.

Work Normally Performed By CERL

As the CAEADS developer, CERL can best adapt CAEADS routines to FE use.

Support Planning Information

FE members of the CAEADS FE Technical Specialty Panel will provide guidance to CERL on FE requirements.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL ENERGY CONSERVATION METHODS

Description

Energy conservation has several components: Training occupants to be more aware of energy usage, improving the efficiency of energy consuming equipment, and implementing new devices/techniques as they become available. A well balanced program containing all three elements is needed to achieve Energy Conservation goals. CERL is actively engaged in activities in all three areas.

Work Normally Performed By CERL

To assist the Facilities Engineer in the near term, CERL developed a list of activities which could be implemented at minimum cost to reduce energy consumption. If the list of activities is too general to achieve desired results, additional work can be performed to modify the list to meet specific requirements.

CERL is monitoring a large number of buildings representing the major categories in the Army to establish Energy Consumption patterns. The data is being used to establish trends, identify conservation opportunities, and in some cases, norms for classes of facilities.

In addition, CERL is evaluating new Energy Conservation devices as they are being introduced on the market.

Through the use of the BLAST program CERL can advise designers/planners on the possible impact of implementing an Energy Conservation project.

CERL has the personnel and equipment needed to evaluate any new device or system and advise the Facilities Engineer or District Engineers on product (system selection and potential benefits).

Support Planning Information

A. As-built drawings of facilities

B. Description of data needed for specific problem

C. Description of new product to be tested

D. Access to site

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

HABITABILITY INTERIOR DESIGN GUIDANCE

Description

Many existing buildings on US Army installations are unable to effectively support the current mission of the unit assigned. In some other facilities, the habitability condition for the user occupants inhibits their motivation and probably impacts their task performance. These facilities can usually be significantly improved by renovating based upon user requirements for task performance and occupant satisfaction conditions. The CERL has the capability to evaluate current habitability conditions, generate recommendations for interior design habitability improvements, and evaluate the renovated conditions.

Work Normally Performed By CERL

The CERL will provide an Architect and Environmental Psychologist to assist the Facilities Engineer in: (1) defining the scope of the habitability improvement project; (2) evaluating existing conditions; (3) developing functional and behavioral requirements; (4) interior design guidance and review of A/E design solutions; and (5) evaluating the renovated facilities after occupancy to determine the occupant response to the physical components of the improved environment.

Support Planning Information

A. Access to drawings of the existing facilities.

B. Access to work area and personnel for surveys and/or interviews.

C. Staff personnel or contract A/E support for document development and construction/ procurement operations.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

CORROSION MITIGATION TECHNIQUES

Description

CERL studies have shown that the corrosion related costs amount to 10-15% of the Facility Engineer's budget. Some of these costs can be reduced by using corrosion control technology such as cathodic protection, water treatment, inhibitors, corrosion resistant materials, and corrosion management.

Work Normally Performed By CERL

CERL will provide engineers and senior technicians to assist facility engineers in establishing a corrosion control program, perform cathodic protection analysis and evaluate corrosion problems to identify causes. The general categories CERL has the capabilities to evaluate include:

a. Materials testing and selection.

b. Cathodic protection.

c. Water treatment.

d. Failure analysis.

Support Planning Information

A. Copy of the project specifications and relevant information should be available.

B. Transportation of materials to laboratory should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

USE OF ALTERNATIVE ENERGY SOURCES

Description

Investigation of Alternative Energy Sources such as Refuse Derived Fuel (RFD), Densified Refuse Derived Fuels (DRFD), biomass and solar for heating and cooling plants. Investigation includes alterations to existing plants as well as new construction. Assist Facilities Engineers in their consideration of these sources as possible alternatives to coal, oil or gas.

Work Normally Performed By CERL

The scope of work performed by CERL has included investigation into the potential general use of alternate fuels and development of design and acceptance procedures for alternate sources.

CERL will provide engineers to assist the Facilities Engineer in planning and developing project documents in the following areas, or to assist selecting the most favorable application of the following areas:

a. Use of Military waste (refuse) in heat recovery incinerators to produce steam or hot water to supplement that produced by a central heating plant, i.e. parallel operations.

b. Use of Military waste as RFD or DRFD in a conventionally designed solid fuel fired boiler as the primary fuel.

c. Use of Military waste as RFD or DRFD as a supplement to coal in an existing or new heating plant.

d. Use of forest waste or industrial wood waste (biomass) as a fuel.

e. Use of commercially available wood waste, either pelletized or hogged, as a supplement to coal, or as a primary fuel in a heating plant.

f. Use of solar energy for heating and cooling of buildings.

Support Planning Information

A. Intended scope of activities

B. Identification of project constraints

C. Access to site and F. E. records such as steam consumption rates estimates of waste collection rates

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

ENERGY MANAGEMENT TECHNIQUES

Description

Energy management techniques addresses the instrumentation and control systems, operating strategies, and the algorithms needed to manage energy conservation base-wide on a dynamic basis.

Work Normally Performed By CERL

CERL has been involved in the Tri-Service Specifications for the Energy Monitoring and Control Systems (EMCS). Future work related to EMCS includes methods for making the system more useful, methods for reducing maintenance cost and improving system availability, and ensuring that the systems perform the needed functions.

Two different test beds are available at CERL for evaluating EMCS components.

CERL personnel have experience in data base design, software development and microprocessors all of which will be applied to the EMCS. Experience in management system development and organizational design is also being used to improve the usefulness of EMCS.

On-going work includes the development of a clamp-on system for monitoring electrical consumption in a building down to branch level and to identify the type of loads being imposed. This effort will include the development of a portable metering recorder and analysis system. In the future, portable devices will be developed for early metering consumption of other energy utilities.

CERL is prepared to assist Facilities Engineers in establishing, operating, and maintaining an EMCS, and for monitoring energy consumption in facilities not included in the EMCS network.

Support Planning Information

A. Device to be evaluated and identified of proposed use of the device.

B. EMCS software documentation to support algorithm verification or improvement activities.

C. Access to building to be monitored.

D. Results of EMCS operating stategies.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

PREPARATION OF MANUALS AND GUIDE SPECIFICATIONS

Description

Preparation of Technical Manuals to assist planners and designers and specifications for use in accomplishing activities through contract. Technical requirements contained in both types of documents should accurately reflect the Army's requirements for quality of both the product and its installation as well as, recognition of industry standards, availability of products, and experience gained through the installation and use of such products. CERL has the capability of preparing specifications which reflect field experience and results of evaluation testing and research projects.

Work Normally Performed By CERL

The scope of work performed at CERL has been generally limited to developing specifications in the Architectural and Structural fields for new construction, maintenance, and rehabilitation of facilities. CERL personnel are also experienced in developing operations and maintenance specifications on a much wider technical field.

The CERL will provide engineers, architects, and specifiers to assist the Facilities Engineer in developing unique project specifications or in evaluating new products or installation techniques not included in the current OCE guide specifications. Services provided include survey and analysis of a situation and identification of need for new specifications (or modification of existing specification), preparation of proposed specifications, coordination with industry representatives to ensure reasonableness of requirements, coordination with reviewing authorities, incorporation of the specifications into an existing specification retrieval system or development of a new specification system, coordination of requirements, with other specification series, publication of final specifications, and evaluation of effectiveness with field experience.

CERL will provide personnel from several diciplines to develop Technical Manuals intended to provide in-depth criteria for material and installation technique selection, or to provide a planning or analysis technique.

Support Planning Information

A. Intended scope of activities

B. Identification of project constraints

C. Access to site

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CRREL

ICE ENGINEERING

Description

Problems related to ice engineering including ice jams, ice bridges, icing of power plant intakes, formation of ice covers, hydraulics of ice-covered water bodies, the bearing capacity of ice and ice forces on structures. CRREL has considerable expertise and facilities dedicated to the solution of such problems.

Work Normally Performed By CRREL

In addition to advice and assistance, CRREL can conduct a wide range of tests in our extensive ice engineering facility. It is equipped with a towing tank, a test basin and a 120-ft flume all of which are refrigerated.

Point of Contact

Commander/ Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

FACILITY PLANNING IN COLD REGIONS

Description

The harsh environment of the cold regions and the lackluster performance of many temperate-zone designs when used in cold regions suggests that alternative concepts for facilities deserve consideration there. Structural envelopes, megastructures, composite buildings, and other concepts which reduce energy consumption, simplify maintenance and enhance the life-style of occupants are worth considering particularly in very cold regions.

Work Normally Performed By CRREL

CRREL can provide advice and assistance on the applicability of various facility types for use in cold regions.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

WRSC-D MARINE DESIGN

Description

The Marine Design Center (WRSC-D) provides centralized expertise for US Army Corps of Engineers on all phases of marine designs. All floating equipment relative to Civil Works type projects are within the purview of the WRSC-D.

Work Normally Performed By WRSC

WRSC-D has in-house expertise in design, specifications and inspection of marine equipment including hull, deck and engine room machinery. In-house expertise capabilities are augmented by use of contract Architect/Engineer services. The general areas of expertise include:

a. Hull design

b. Deck & engine room equipment

c. Materials selection

d. Marine construction and inspection methodologies and criteria

e. Main propulsion and auxiliary systems design

f. Special expertise in design of dredges, tugboats, floating derrick barges and other floating equipment normally associated with dredging operation and/or navigation.

Support Planning Information

A. Performance criteria

B. Site access, if appropriate

C. Fund citation

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
ATTN: WRSC-D
Kingman Building
Ft. Belvoir, VA 22060

HEC

HYDROLOGIC ENGINEERING RESEARCH

Description

Research and development of study procedures and generalized computer programs for hydrologic engineering studies can be performed. Technical subjects include statistical analysis of hydrologic phenomena; flood runoff modeling; natural stream flow characteristics (flow, elevation, velocity), bank erosion, and sediment transport; reservoir sizing and operation for flood control water supply, hydroelectric power, and waste management; dam-break analysis, and water quality of natural streams and impoundments.

Work Normally Performed By HEC

The HEC can provide a technical specialist on-site phone consultation or host office visit to:

a. Assist in defining a research need

b. Direct inquiries to complementary research efforts conducted elesewhere

c. Perform specific R&D for small scale projects generally requiring less than 1/2 man-year effort. A wide variety of research publications can be obtained from HEC's library

Support Planning Information

A. HEC's experience has been primarily in Civil Works applications.

B. Services beyond simple responding to inquiries require prior reimbursable agreement.

C. Lead times for specific R&D efforts generally are six months

Point of Contact

Director
US Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, CA 95616
FTS 448-3285
Comm (916) 440-3285

HEC

HYDROLOGIC ENGINEERING RESEARCH

Description

Research and development of investigation methodologies and generalized computer programs for planning studies can be provided. Technical research can be performed in engineering, economic and environmental aspects of planning flood control/flood plan management, water supply, and hydropower project. Research in generally applicable subjects of data management systems (geographic data systems and others), and systematic planning strategies can also be provided.

Work Normally Performed By HEC

The HEC can provide a technical specialist on-site, by phone consultation or host office visit to:

a. Assist in defining a research need.

b. Direct inquiries to complementary research efforts conducted elsewhere.

c. Perform specific R&D for small scale projects generally requiring less than 1/2 man-year effort. A wide variety of research publications can be obtained from HEC's library.

Support Planning Information

A. HEC's experience has been exclusively in Civil Works applications.

B. Services beyond simple responding to inquiries require prior reimbursable agreement.

C. Lead times for specific R&D efforts generally are six months.

Point of Contact

Director
US Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, CA 95616
FTS 448-3285
Comm (916) 440-3285

HEC

HYDROLOGIC ENGINEERING RESEARCH

Description

Regularly scheduled one/two week courses in hyrologic engineering and water resources planning are open to Corps of Engineers' professionals. Special courses can be presented when HEC resources permit.

Work Normally Performed By HEC

The HEC organizes and presents annually approximmately 20 weeks of training for classes numbering up to 32 students. Subjects include hydrologic engineering courses in, for example, river hydraulics and sedimentation, hydropower, reservoir systems, urban hydrology, flood plain hydrology, dam break analysis and water quality evaluations.

A limited number (2-4) special courses are conducted on a reminursable basis for requesting Corps' field offices.

Support Planning Information

A. HEC's training experience has been exclusively in Civil Works applications.

B. HEC course descriptions are distributed to Corps' Civil Works installationns each year.

C. Course space allocations are managed by the Corps' Huntsville Division

Point of Contact

Director
US Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, CA 95616
FTS 448-3285
Comm (916) 440-3285

TECHNICAL SERVICES

WES

CEMENT AND POZZOLAN TESTING

Description

Cement and Pozzolan Acceptance Testing is provided in accordance with ER 1110-1-2002 and includes the following:

a. Pretesting of cements and pozzolan for compliance with applicable project specifications and inspection of shipments of these materials to specified projects.

b. Establish and monitor prequalified sources of cement by type under the Cement Quality Management System.

c. Provide immediate evaluation of the chemical and physical properties of cementitious materials submitted from field projects.

Work Normally Performed By WES

A. Instrumental and standard wet chemical methods are employed to determine the chemical composition of cements, pozzolans, and other cementitious materials.

B. Determine the heat hydration of portland and other cements and blends thereof with other materials, such as with pozzolans, by calorimetric and thermochemical methods.

C. Evaluate the physical properties of portland cements, blended cements, and pozzolans by determining the specific gravity, fineness, setting time, air entrainment, cube strength, water requirement, soundness and reactivity with cement alkalies of these materials.

D. A report of the test is issued indicating specification compliance and nature of any unusual properties indicated.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

CHEMICAL ANALYSIS OF WATER, SOIL, SEDIMENTS

Description

Water, soil, and sediments are analyzed by both instrumental and wet chemical methods to determine the composition and concentration of the constituents in the samples.

Work Normally Performed By WES

A. WES has the laboratory facilities and professional staff available for analyzing water, soil, and sediments. The laboratory is equipped with the necessary instrumentation for analysis, such as: UV-visible spectrophotometers, liquid chromatographs, gas chromatographs, atomic absorption spectrophotometer, graphite furnace, tubidity meter, pH meter, conductivity meter, X-ray emission, and X-ray diffraction. Samples will be analyzed for those parameters requested by the Facilities Engineer, and chemists are available for assistance in analytical decisions, sampling, and sample preservation.

B. Most parameters normally requested in water, soil, and sediment analysis can be determined qualitatively and quanitatively in the laboratory. Water, soil, and sediment quality are measured analytically to determine if they meet standards set by the Environmental Protection Agency or state and municipal pollution agencies.

C. Water sample parameters analyzed for and by the laboratory include major cations and anions, acidity, alkalinity, chemical oxygen demand, chloride, fluoride, cyanide, hardness, different metals, forms of nitrogen, phosphorus, sulphide and sulfates, oil and grease, pesticides, herbicides, PCB's, pH, phenol, specific conductance, turbidity, total solids, dissolved solids, and other specific parameters. A list of the water parameters, detection limit, and test methods can be obtained from the Chemistry and Plastics Branch, Structures Laboratory, U. S. Army Engineer Waterways Experiment Station.

D. Soil and sediment parameters analyzed for and by the laboratory include total chemical analysis (major oxides),

exchangeable cations, cation-exchange capacity, chemical oxygen demand, total and organic carbon, cyanide, sulfates, chlorides, total sulfur, sulfides, metals, forms of nitrogen, pesticides, herbicides, PCB's, oil and grease, volatile solids, and other specific parameters. A list of the soil and sediment parameters, detection limit, and test methods can be obtained from the Chemistry and Plastics Branch, Structures Laboratory, U. S. Army Engineer Waterways Experiment Station.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES PLASTICS TESTING

Description

Plastics, resins, and polymeric coatings are tested for physical properties, and analyzed by chemical methods for indentification and chemical composition. These tests are performed to determine if the materials conform to the requirements of specifications, and to determine the durability, adhesion, physical characteristics, chemical resistances, and weatherability.

Work Normally Performed By WES

A. WES has the laboratory facility and professional staff to perform chemical analysis of plastics. The plastics can be identified, and the chemical composition determined, using instrumentation and wet chemical methods. The laboratory is equipped with chemical instrumentation, such as infra-red spectrophotometer, liquid chromatographs, and gas chromatographs for analysis.

B. The necessary testing equipment for determining most physical properties of the plastics is available. Testing equipment available includes: instron testing machines, compressive testing machines, weatherometer, thermal analyzers, and other necssary equipment. Physical properties, such as tensile strengths, tensile elongation, compressive strengths, modulus, flexural strengths, hardness, adhesion, thermal expansion, and resistance to weathering and chemicals, are some of the more common properties determined.

C. Acceptance testing of membrane forming compounds for curing concrete is performed to determine if the material meets the requirements of ASTM Designation: C 156 or CRD-C 300.

D. Epoxy resins are tested to determine if the material meets the requirement of MMG-350B and 650B, or other epoxy resin specifications. Chemists and engineers are available for providing expertise in the techniques for repairing concrete with epoxy resins. WES will provide experienced personnel for inspecting and evaluating epoxy resin applications.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

MINERALOGICAL COMPOSITION OF SOIL

Description

A vital part of preliminary soil investigation is characterization of the material by determination of its mineralogical composition. This same procedure can be used and is used in cases where soil problems have occurred.

Work Normally Performed By WES

A. The bulk of the mineralogical examination is usually made using X-ray diffraction equipment. This can be supplemented by examinations with light microscopes, scanning electron microscopy, or differential thermal analysis if and as needed to supply special information.

B. The data are usually provided with estimated amounts of constituents based on visual examination of and comparisions between the X-ray patterns. When the composition of a sample is suitable the data can be provided on a semiquantitative basis. The feasibility of this is known after the mineral composition has been determined.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

SPECIAL INVESTIGATIONS OF MATERIALS

Description

When there is a need to know whether a material is organic or inorganic, crystalline or non-crystalline, then a petrographic examination is indicated. In most cases the results will provide specific identification of a material.

Work Normally Performed By WES

All the equipment of a fully equipped petrographic laboratory is available and may be called into use as needed. This includes polarizing and stereoscopic microscopes, X-ray diffraction and emmision equipment, a scanning electron microscope, and a differential thermal analysis unit.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES GROUTING APPLICATIONS

Description

Portland cement and chemical grouting applications are numerous and varied and in recent years are increasing as means in making remedial repairs to correct deterioration occurring in foundations and structures.

Work Normally Performed By WES

The Structures Laboratory at WES provides consulting services relative to the feasibility of making grouting repairs to foundations, structures, tunnels, shafts, etc. In the instance or repair jobs requiring moderate size efforts, WES will provide personnel and equipment to conduct such repairs. In the case of repairs of extended scope, WES will draft or assist in drafting specifications and will provide technical direction during the field application by contractors.

Support Planning Information

A. Initial communication to determine if grouting application is a possibility.

B. Furnish WES with photos and drawings.

C. WES personnel be invited to attend planning and preconstruction meetings.

Point of Contract

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES INSTRUMENTATION OF EXISTING CONCRETE STRUCTURES

Description

Many older concrete structures are experiencing general deterioration and cracking of concrete. Sensitive electronic and mechanical instruments can provide useful information regarding crack widths, movements, pressures, deflections, temperature, and tilt.

Work Normally Performed By WES

WES will provide personnel to design and install instrumentation systems to measure desired parameters. A report will be prepared describing the work and presenting a data analysis. The following instrumentation can be provided:

a. Joint and crack meters

b. Extensometers

c. Pressure gages

d. Tilt meters

e. Laser deflectometer

f. Thermocouples and resistance thermometers

g. Data loggers

Support Planning Information

A. Provide any necessary drilling.

B. Provide building or protective area for recording equipment.

C. Provide 110-v AC power as needed.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

CONDITION SURVEY OF CONCRETE IN SERVICE

Description

Condition surveys of concrete in service are objective steps in evaluating deteriorated concrete in a structure. It is essential to establish the extent of the damaged concrete and determine if the major portion of the structure is of suitable quality on which to build a sound repair; in some instances, the structure may have to be replaced.

Work Normally Performed By WES

The WES will provide an engineer to meet with the sponsor to make an assessment of the problem. It is desirable to determine the cause of the deterioration. The damage may be the result of poor design or faulty workmanship, mechanical abrasive action, leaching, chemical action inherent in the concrete mixture, deicing agents, or long exposure to unfavorable environments.

A description of the structure or pavement is obtained. The present condition of the structure is assessed including overall alignment, distressed zones (beams, columns, walls, etc.), surface condition of the detrimental elements is next studied including the exposure, drainage, loading, and soil (foundation conditions). Information is next obtained concerning the original condition of the structure, materials used during construction, the construction practices used, and the initial physical properties of the hardened concrete.

After the cause of the damage is known and the extent of the damaged concrete is ascertained, the degree and extent of repair is considered. Suggestions for repair can be made by WES. They can be included in official reports or presented informally. Supervision for state-of-the-art repair techniques is also available at the WES.

Support Planning Information

A. Operations should be as close to normal as possible.

B. Copies of original engineering drawings (working and as-built), construction reports and photographs, and operation records should be available.

C. Concrete test records should be available.

D. Geological information concerning the foundation should be available.

E. Personnel familiar with the design and operation of the structure should be on hand for consultation.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

NONDESTRUCTIVE TESTING OF CONCRETE STRUCTURES

Description

Nondestructive methods and techniques can be used to quantify some physical properties and determine the general quality of concrete or concreting materials. It is extremely useful in evaluating a structure by component parts, i.e., foundation, concrete structure, and concrete-foundation interaction.

Work Normally Performed By WES

WES will provide personnel to conduct a condition survey. Parts of the structure are studied relative to structural integrity, existence of any critical conditions that would cause early failure, deterioration of materials, existence of severe cracking, and movement. Some nondestructive techniques that can be utilized:

A. Ultrasonic pulse velocity.

B. Resonant frequency.

C. Dynamic deflection.

D. Rebound hammer.

E. Pulse echo.

Support Planning Information

A. Drawings of structure should be available.

B. Survey normally requires the use of a "bucket" truck provided by the customer.

C. Customer may be required to provide one or two technicians to assist survey party.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES PETROGRAPHY OF CONCRETE

Description

The intent is to use the facilities of a petrographic laboratory to examine concrete or the nonliquid phases used in concrete. The equipment available includes transmitted and reflected light microscopes, X-ray diffraction and X-ray emission spectrometry units, a scanning electron microscope, and a differential thermal analysis unit.

Work Normally Performed By WES

A. Old and/or distressed field concrete is subjected to petrographic examination to determine its condition and to determine what mechanism, if any, led to its condition. Common examples of such mechanisms are alkali-silica reaction, alkali-carbonate rock reaction, or frost damage.

B. Those materials subject to use in concrete such as aggregates or pozzolans are examined and identified. This can be a useful first step in determining their suitability for use.

C. Data supplied by items a and b may be used to make engineering judgments or remedial work to be performed or such other action as may be indicated.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

COMPUTER COMPUTATION OF TEMPERATURES AND THERMAL STRESS AND STRAIN IN CONCRETE STRUCTURES

Description

Concrete structures in which either large dimensions or unique geometry accompanied by substantial potential for internal or external temperature change may be subjected to sufficient thermal stress and strain to cause undesired cracks to form. Finite element method computer calculations simulating temperature and thermal stress and strain distribution during and following construction can be used to assist in developing construction temperature control plans designed to minimize thermally related problems. These simulations may also be used to evaluate thermal or thermal-mechanical response of a structure under operational conditions.

Work Normally Performed By WES

WES will conduct computer studies and tests of thermal and mechanical properties used for input to the computer programs as required.

Support Planning Information

A. Plans for structure to be studied including material distribution within the structure.

B. If a construction simulation, complete specification of construction variables are necessary.

C. External thermal and mechanical stimuli.

D. Thermal properties of all materials used as a function age (if applicable). Thermal properties as a function of temperature required if a function of temperature.

(1) Heat generation history.

(2) Thermal conductivity.

(3) Specific heat.

(4) Density.

E. Mechanical properties as a function of age (if applicable).

(1) Modulus of elasticity.

(2) Poisson's ratio.

(3) Coefficient of thermal expansion.

(4) Creep at several loading ages (if applicable).

(5) Tensile strain capacity (if evaluation of crack onset is desired).

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

Description

Engineering studies involving heat flow or temperature change or both require that the thermal properties of the materials involved be defined. Other applications may involve determining durability if the materials are critically saturated and are subjected to periodic freezing and thawing.

Work Normally Performed By WES

The following tests are conducted at WES on prepared laboratory specimens of rigid solids.

a. Thermal properties tests including determination of thermal conductivity computed from measurement of:

   (1) Thermal diffusivity.

   (2) Specific heat.

   (3) Density.

b. Other thermal tests include measurement of:

   (1) Coefficient of thermal expansion.

   (2) Critical dilation of moisture laden materials subjected to freezing.

   (3) Freezable water content in moisture laden materials.

   (4) Freeze-thaw resistance - moisture laden specimens are subjected to cyclic freezing and thawing. Periodic measurement of fundamental frequency is performed to quantify the level of frost resistance.

Support Planning Information

A. Material samples of sufficient size from which tests specimens may be fabricated.

B. If concrete, supply of constituent materials and mixture designs.

C. Specification of moisture content desired and/or specific requirements of moisture retention.

D. Specification of ranges of temperatures within which tests are to be conducted, except where not applicable.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

MECHANICAL IMPEDANCE MEASUREMENTS

Description

Vibration techniques are used to determine the mechanical properties of dynamic mass, stiffness, and damping of materials such as soil, gravel sand, fresh concrete, and others.

Work Normally Performed By WES

WES has the equipment and technicians that can meet the needs specified by the customer. The following items are used to make mechanical impedance measurements.

a. Mechanical impedance equipment such as oscillators, amplifiers, filter circuits, etc.

b. Electromagnetic drivers or vibrators.

c. Transducers to measure input force and material motion response.

d. X-Y recorders and magnetic tape recorders.

Support Planning Information

A. Consultation by telephone, visit, or correspondence to discuss problem.

B. Arrangements for materials to be shipped to WES.

C. Allow adequate lead time for scheduling the mechanical impedance equipment.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

ENGINEERING GEOLOGY AND ROCK MECHANICS

Description

Conduct topical, regional, and site specific investigations in a variety of geologic subdiciplines such as engineering geology, geomorphology, stratigraphy, sedimentation, and rock mechanics on a reimbursable basis.

Work Normally Performed By WES

Determination of strength properties of rock. Determination of seepage characteristics of rock. Determination of engineering properties of rock masses. Provide advice on quarry location and operation. Conduct slope stability investigations. Conduct map, field, and remote imagery investigations to locate sources of construction materials. Conduct nondestructive x-radiography evaluations of soil and rock to determine structural density and weakness. Develop computer stored record of existing subsurface data.

Support Planning Information

Initial contact with WES should provide as much information as possible on the nature of the problem, location, and conditions to assist in preliminary "desk investigation" using existing information sources.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES AQUATIC PLANT CONTROL

Description

The WES has been designated as the Corps' lead laboratory for aquatic plant control research. The research program has responsibility for developing and transferring the technology needed by the field operations units to control and manage aquatic plant infestations in an environmentally compatible manner at the least possible cost. The WES is investigating several techniques for aquatic plant control such as chemical programs and use of biological and mechanical control techniques.

Work Normally Performed By WES

Facilities Engineers with operational problems with control of aquatic plants can be provided the following assistance:

a. Problem identification and assessment of extent of infestation.

b. Evaluation of the effectiveness of current techniques of control-biological, chemical mechanical, and integrated.

c. Field testing of selected control techniques.

d. Analysis of the results of control techniques.

e. Recommendations as to the most cost-effective control technique based on field testing.

f. Integrating the recommended control technique into the operational capability of the Facilities Engineer.

Support Planning Information

The information needed from the Facilities Engineer will depend on the type of problem and degree of assistance requested.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

MILITARY HYDROLOGY

Description

The operation of a military facility is often hampered by changes in the hydrology of the streams and river basins on the facility. Water level changes in a small stream vary from a several foot rise (blocking a ford to a major flood condition (destroying bridges and other structures). The identification of responses of a stream of river to varying weather conditions is the subject of recent WES research.

Work Normally Performed By WES

The WES can provide a team of engineers, systems analysts, and technicians with a diversity of experience in using existing hydrologic and hydraulic computer models and in the collection, analysis, and presentations of information on all aspects of water that may affect the operations of a military facility(i.e. streamflow, current velocities, potential flood characteristics, channel geometry, soil moisture, and weather conditions). Problems that could be addressed by this team include, determination of flood levels, flood damages, and erosion potential of a water system and to a more limited extent changes in water quality and wildlife habitat quality as a result of changes in the hydrology of a stream or river.

Support Planning Information

The information required from the Facilities Engineer will depend upon the types of problems to be addressed and the degree of assistance requested.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES ENVIRONMENTAL BASELINES

Description

The management policy prescribed in AR 200-1, "Environmental Protection and Enhancement," specifically stated that the Facilities Engineer will consider the environmental consequences as well as the technical and economic factors of a proposed action. To be able to consider the environmental consequences, the Facilities Engineer requires a basic set of data (i.e. an environmental baseline) that describes the present (preaction) conditions of the environment on his facility. In 1972, the WES began a series of studies designed to develop methodologies for characterizing environmental baselines and since 1974 have applied the methodologies developed to several military facilities. A comprehensive aquatic survey and/or monitoring and assessment can provide baseline data for project planning and design, impact assessment, and post construction evaluation.

Work Normally Performed By WES

The WES can provide a team of engineers, life scientists, and technicians to collect, analyze, and present environmental baseline data pertinent to the Facilities Engineer's Master Plan. Although each facility will have somewhat different data collection requirements, depending upon what data are already available, the data presented in the product usually irclude vegetation, topography, surface hydrology, soils, geology, water quality, weather, wildlife and wildlife habitats, and archaeology. A computer information system to assist in processing, storage, and retrieval of data is being developed and can be made availabale for the Facilities Engineer. Ecosystem analysis procedures (i.e. computer simulation models) to predict the impact of a proposed action can be developed at the request of the Facilities Engineer. As previously stated, the nature of the environmental measurements will depend upon the needs of the field office or installation. The following services can be provided:

a. Delineation of aquatic habitats according to water depth, currents, water chemistry, sediment type and biological assemblages.

b. Development and testing of sampling equipment and

techniques and experimental design to quantitatively measure fishery and benthic species diversity, abundance, and distribution and physicochemical parameters in aquatic ecosystems.

c. Laboratory evaluation of benthic, fisheries and physiochemical samples.

d. Development of aquatic monitoring programs to meet specific project requirements.

The results of field and laboratory investigations will be summarized in an ETL or other report form detailing findings and recommendations.

Support Planning Information

A. Statement of problems and desired end products.

B. Copies of the master plan, land management plan, forest management plan, wildlife management plan, and outdoor recreation plan for the facility.

C. List of environmental data that has already been collected by the Facilities Engineer.

D. List of available maps, aerial photography, and soil and wildlife surveys of the facility.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

SURFACE OR GROUNDWATER POLLUTION INVESTIGATIONS

Description

Reports of surface or groundwater pollution require rapid response by specially trained and equipped personnel. The Waterways Experiment Station (WES) can provide inspection teams to document a pollution problem and provide recommendations for remedial action.

Work Normally Performed By WES

WES can supply trained engineers and technicians to ascertain the nature of the pollutant and the source and extent of the pollution. The team will approach the problem by detailed inspection of site, analysis of water and/or soil samples and discussions with operating and maintenance personnel. The problem will be documented for action by responsible authorities.

Support Planning Information

A. MAPS and/or plans of the site involved should be available.

B. Operations personnel should be available for discussion.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

NON - ROUTINE CHEMICAL ANALYTICAL SERVICES

Description

Often in pollution control activities it is necessary to obtain an accurate chemical analysis of materials that cannot be handled by commercial chemical analytical laboratories. The material to be analyzed may require special handling or pretreatment or the levels to be established may be below the detection limit for routine analytical techniques. The Waterways Experiment Station (WES) has available trained chemists and specialized equipment to handle unusual analytical problems.

Work Normally Performed By WES

WES can provide qualified chemists and technicians to assist in obtaining accurate chemical data. The analytical group will review the problem you are investigating, suggest a sampling system appropriate to your needs and develop the sampling and analytical procedures you require. The laboratory can perform the analyses or contract with other laboratories you select to have the analyses performed under WES supervision. In all cases WES will maintain a strict quality control program to assure the data generated are accurate and dependable.

Support Planning Information

A. Personnel acquainted with the problem addressed should be available for discussion.

B. Access should be obtained to the area where sampling is proposed.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

FESA WATER CHEMISTRY

Description

In many systems for which a Facility Engineer has responsibility, water is a primary constituent. Potable water is controlled and treated on a periodic basis in accordance with the requirements established by local authorities. However, this potable water may be used in other facility systems with little or no additional control which can significantly reduce system effectiveness.

Work Normally Performed By FESA

FESA will provide a team of engineers and technicians with a diversity of experience in water chemistry. This team will inspect designated systems which utilize significant amounts of water. While each system and its water control requirements may be different, the team will inspect the systems by the following methods.

a. By a detailed inspection of equipment, analysis of water samples, and discussions with system operating and maintenance personnel.

b. By observation of practices and procedures used and comparison with similar systems whose records reflect excellent performance.

The team will prepare a report which identifies the observed condition of the system; existing practices and procedures which should be retained, altered, or eliminated; results of special tests made; and specific recommendations to improve system effectiveness.

Support Planning Information

A. System operations should be as near normal as possible.

B. Interruptions in system operations should be

possible.

C. As-built drawings and manufacturers' literature for all systems and components should be available.

D. System logs and operating/maintenance histories should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA BOILER EFFICIENCY TESTING

Description

A boiler and hot water plant tune-up program is available to improve combustion and thermal efficiencies. The prime object is to service installations having boilers with capacities in excess of 3.5M BTU/hr.

Work Normally Performed By FESA

FESA will provide an engineer and technicians experienced in power plant operation and maintenance of boiler controls and instrumentation. A bench-mark test is performed and excess air trimmed within smoke and emission limitations. Where controls do not respond to adjustment, a deficiency listing is furnished together with air as-found and as-left efficiency report. This report also states the calculated yearly fuel savings.

Support Planning Information

A. Plant operations should be close to normal.

B. Load variations should be permissible.

C. Plant logs and operating/maintenance histories should be available.

D. As-built drawings and manufacturers literature need to be on hand.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

APPLICATION OF HEAT RECOVERY TECHNIQUES

Description

Heat reclamation is the recovery and utilization of heat energy that is otherwise rejected to waste. Waste heat may be used as a substitute for a portion of the heat energy that would normally be required for heating, cooling, and domestic hot water systems. Heat recovery conserves energy, reduces operating costs, and reduces peak loads. The types of heat recovery equipment available are as follows:

a. Thermal Wheels
b. Run-Around-Coil Systems
c. Heat Pipe Systems
d. Air-to Air Heat Exchangers
e. Heat Pump Based Heat Exchange Systems
f. Shell and Tube Heat Exchangers
g. Incinerators
h. Waste Heat Boilers
i. Heat-of-Light Systems

Typical applications of the various types of heat transfer equipment listed above are as follows:

a. Transfer energy between exhaust and inlet air ducts
b. Heat recovery from:

   (1) flue gases
   (2) laundry and/or kitchen waste water
   (3) engine or combustion turbine exhaust and cooling systems
   (4) incinerators
   (5) condensate return systems
   (6) refrigeration system hot gas
   (7) condenser water systems
   (8) air cooled condensers

c. Utilize heat from internal spaces for heating perimeter areas.

Work Normally Performed By FESA

FESA will provide engineering support and technical

advice in the application and evaluation of various heat recovery techniques. The type and scope of support provided is tailored to meet the specific requirements of the requester. FESA can provide assistance in the following areas:

a. General guidance on types and applicability of heat recovery systems.
b. Economic analysis of techniques and evaluation of ECIP applicability.
c. Technical review of procurement specifications and proposals.
d. Assistance in accepting testing and inspection.

Support Planning Information

The type of support planning information required depends greatly on the scope of assistance requested. The following types of information are generally required:

a. Copies of A/E proposals and conceptual designs
b. Drawings of the affected systems
c. Load profiles and usage patterns
d. Copies of documents to be reviewed

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

ETL ENVIRONMENTAL INFORMATION

Description

There is a great deal of concern about the environment and about the environmental impact of man's activity. Environmental information can be quickly and economically developed from the systematic analysis of stereo aerial photography. The information can include an environmental data base, the identification of areas requiring closer study, and a prediction of the environmental impact of current and planned activities. Development of the information from photographs is best done by a team of interpreters with expertise in as many of the following disciplines as possible:

a. earth sciences -- geology, physiography, geomorphology, pedology

b. cultural/social science -- cultural geography, anthropology, economics

c. biological sciences -- ecology, botany, plant physiology

d. other disciplines, such as archeology or law, are helpful for specialized studies

The interaction of the team members, each making contributions based on his expertise, enables the rapid development of a large amount of information. The technique is inexpensive -- photo coverage for 400 square miles at 1:20,000 (the optimum scale) costs less than $350.

Work Normally Performed By ETL

Consultant support is available either to train a requester's personnel in the technique or to assist a requester in locating and arranging contractor support for a project. A two-week training course in the technique has been developed, and it is normally adapted to the area and interests of the requester.

Support Planning Information

The type of support planning information required depends greatly on the scope of assistance requested. Reimbursement of support costs is required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Engineer Topographic Laboratories
Ft. Belvoir, VA 22060

CERL

ACOUSTICAL SOUND AND VIBRATION MEASUREMENTS, NOISE MONITORING

Description

Measurements of the sound or noise emissions and the vibration emissions of any Army equipment, materials, processes, either in situ, or an especially selected environment. Monitoring of the short or long term noise emissions from a source or group of sources up to and including an entire installation. These capabilities are uniquely tailored to the special, highly impulsive noise produced by such Army unique sources as artillery, armor, small arms, rockets, and helicopters.

Work Normally Performed By CERL

CERL will provide an engineer or senior technician, or as required a team of engineers and technicians led by a senior engineer, to perform required sound and vibration measurements or noise monitoring. CERL has the capability and has measured and monitored:

a. Large Army weapons (armor and artillery)

b. Rockets

c. Helicopters

d. Aircraft

e. Vehicles

f. Fixed sources, such as industrial plants and factories

g. Small arms

CERL has a unique noise monitoring capability specifically designed for Army problems. It is also capable of handling sonic booms.

Support Planning Information

There should be a complete statement as to the background of the measurements, their purpose, and their scope.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

ETL

MOVEMENT OF LARGE STRUCTURES

Description

The failure of large structures or solid masses such as buildings, bridges, slide areas, or tunnels can be disastrous. Timely warning of such a failure will enable preventive action or evacuation of personnel. An advanced trilateration technique is available which can detect small movements (3 millimeters or less) in large structures. These small movements are often warnings of structural failure.

Work Normally Performed By ETL

A consultant will instruct personnel in the technique and assist them in applying it to structures in question. The support normally requires five days; three days in the classroom, one day in the field, and one day for discussion of particular problems. Data reduction and a short report are provided. Instrumentation, if not locally available, can be provided.

Support Planning Information

A. Reimbursement of support costs is required.

B. Classroom facilities, depending on the number of personnel to be trained, are required.

C. Transportation to and from the field site is required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Engineer Topographic Laboratories
Ft. Belvoir, VA 22060

CERL

PREPARATION OF MANUALS AND GUIDE SPECIFICATIONS

Description

The CERL Paint Laboratory has an extensive background in the entire field of coatings. This background has been the basis for their preparation of the following manuals and guide specifications:

a. EM-1110-2-3400,Paint Manual, New Construction and Maintenance.

b. CW-09940 Painting: Hydraulic Structures and Appurtenant Works, Construction Guide Specification.

c. Real Property Maintenance Activities Guide Specifications (RPMA) Topics #17, #18, and #19.

Work Normally Performed By CERL

CERL will prepare the first draft to the sponsor's format requirements. After coordination CERL will make appropriate changes and submit a second draft or a camera ready copy to the sponsor.

Support Planning Information

The sponsor should supply:

a. All format and content requirements for the document.

b. Either coordination with field agencies or a list of agencies with whom coordination must be conducted.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

QUALITY ASSURANCE TESTING OF PAINTS AND COATINGS

Description

Many Federal and military specifications cover paint and related products. Quality assurance testing of these items is necessary to insure the Facilities Engineer is using satisfactory materials and receiving full dollar values. Test results and recommendations are supplied with a short turn-around time and at a reasonable cost.

Work Normally Performed By CERL

The quality assurance testing will be performed at CERL by a chemist experienced with paint testing procedures. CERL has the capabilities to perform all the physical and chemical tests necessary to provide an accurate acceptance recommendation. If materials do not meet specification requirements, considerations will be made as to the consequence of specification variances based on the type of coating, expected coating exposures and expected life of the coating before making final recommendations.

CERL has a current file of all Federal, military, and Corps of Engineers specifications regarding paints and coatings. Non-standard tests can be developed and performed on coating materials as conditions warrant. Testing can also be done on coatings covered by specifications other than listed above or on non-specification paints and coatings.

Support Planning Information

A. Type and specification of coating. If other than Federal, military or Corps of Engineers specifications, a copy of the appropriate specifications should be made available.

B. Manufacturer, date of manufacture, batch number, and color of desired coating.

C. Project contract number.

D. Two one-quart samples, well mixed to insure a homogeneous and representative sample.

E. Transportation of samples to laboratory.

F. Name and phone number of person familiar with the particular job to act as a point of contact. This will help provide for a speedy and accurate reply.

G. Address and office where written test reports are to be forwarded.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

PROTECTIVE COATINGS DEVELOPMENT OF

Description

Coatings are developed to meet specific needs when standard specification coatings are not appropriate. Several examples include:

a. Vinyl coatings for use on hydraulic structures formulated with solvents meeting restrictive air pollution requirements.

b. Formulation of a high performance immersion coating having a specific color for ascetic coordination.

c. A primer paint for a specific bridge formulated with the ability to penetrate residual rust and void of the traditional pigments which might have been hazardous to the ecology of the area.

Work Normally Performed By CERL

CERL will provide a chemist who will be able to analyze the specific need in terms of coating requirements. If an appropriate coating is not available either within the Federal system or from private industry the chemist will formulate a coating to meet the specific need. After formulation the coating will be tested in the appropriate environment to determine its performance characteristics. If CERL chemists do not have the required expertise in the specific area their contacts within the private sector can usually provide the required services. Services normally provided by CERL include:

a. Determination of coating requirements.

b. Formulation of raw materials to provide paint with appropriate characteristics.

c. Manufacture laboratory batches of formulated coating.

d. Test formulation in controlled environment.

e. Locate commercial manufacturers who can produce the material to specification requirements.

f. Provide specifications, test results and list of manufacturers to requesting agency.

Support Planning Information

Requesting agency will supply all available information relative to coating environment, substrate preparation tolerances, required life expectancy of the coating system and previous coatings used along with their case histories.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

SELECTION AND APPLICATION OF PAINTS AND COATINGS

Description

With the many types of paints and coatings available today, choosing the proper coating to use in a particular situation may be confusing. Not only is coating selection important but surface preparation and application methods can also be critical. These considerations are especially true when coatings are used to protect materials in unusual, critical or highly corrosive exposures. CERL has the capability to help the Facilities Engineer select the proper coating system, surface preparation and application methods. CERL personnel are also available to conduct on-site inspection of coating failures in order to make recommendations to help eliminate their recurrence.

Work Normally Performed By CERL

CERL will provide a chemist with the necessary field and laboratory background in coatings to assist the Facilities Engineer with whatever coatings or application questions and/or problems may be present. CERL receives several hundred consulting calls per year regarding paint or paint related problems. Several on-site inspections are also made each year due to problems, such as (1) poor application techniques resulting in early coating failure, (2) poor ventilation and excess overspray in vehicle spray booth,and (3) degree of surface preparation necessary when using special formulated anti-corrosive coating. If selection of a proper coating cannot be made using standard Federal or military specifications, proprietary coatings can sometimes be recommended.

Support Planning Information

Several input items are necessary or helpful when providing recommendations regarding proper coatings selection, application procedures or possible reasons for coating failure:

a. Reason for coating item - protective or decorative.

b. Location and size of item.

c. Type of material from which item is constructed.

d. All pertinent environmental conditions or exposures of item.

e. Life expectancy of item or coating.

f. Types of previous coating(s), if any.

g. Previous surface preparation, if any.

h. Ability to sandblast item.

i. Environmental conditions during any previous painting.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERC

COASTAL ECOLOGY

Description

The purposes of the ecological research program of the Coastal Engineering Research Center are to determine the ecological effects of the Corps' coastal engineering activities, quantify them where possible, and to develop techniques and procedures which create or enhance desirable effects. The program is based on the needs of field offices, is conducted primarily in the field, and provides specific guidance for field personnel.

Work Normally Performed By CERC

CERC will provide guidance to field engineers in the following areas:

a. determining ecological effects of coastal dredging, beach nourishment, coastal construction and coastal structures.

b. determining feasibility of using vegetation in both structural and non-structural approaches to coastal navigation, hurricane protection, and bank erosion projects.

Point of Contact

Commander/Director
US Army Corps of Engineers
Coastal Engineering Research Center
Kingman Building
Ft. Belovoir, VA 22060

CERC

HARBORS

Description

The objective of this research is to develop hydraulic criteria for design, operation, and maintenance of harbors. Specific problem areas which will be considered include, but are not limited to, navigation channel stability; design of entrance channels; harbor oscillation; tsunami wave and hurricane surge conditions; breakwater, jetty and wave absorber design; harbor flushing; and coastal erosion and environmental effects.

Work Normally Performed By CERC

CERC will provide guidance to field engineers in the areas of design criteria and construction practices for harbors.

Point of Contact

Commander/Director
US Army Corps of Engineers
Coastal Engineering Research Center
Kingman Building
Ft. Belvoir, VA 22060

CERC

BEACH NOURISHMENT

Description

Coastal engineers have long recognized that the textural properties of borrow material have important effects on the postplacement behavior of beach fill. An important question arises with respect to the volume of material taken from the borrow zone which will be effectively lost from the project during the following placement due to sorting processes. The design engineer is required to estimate the proportion of a proposed borrow material which will serve a useful function in a specific project requiring beach fill. This estimate is then used to compute the effective cost of a unit of usable fill material from the proposed borrow site, based on estimated actual costs of obtaining and placing a unit of borrow material. The effective unit cost of usable fill from a given borrow zone is the product of the actual cost of obtaining and placing a unit volume of borrow material times the "overfill ratio", which is defined as the volume of actual borrow material required to produce a unit volume of usable fill. Mathematical models have been developed and are being refined to calculate this "overfill ratio" and engineers now have a tool to effectively design beach nourishment projects.

Work Normally Performed By CERC

CERC will provide guidance to field engineers on the use of mathematical models to calculate fill ratios for beach nourishment.

Point of of Contact

Commander/Director
US Army Corps of Engineers
Coastal Engineering Research Center
Kingman Building
Ft. Belvoir, VA 22060

CERC

SHORE PROTECTION

Description

Knowledge of the interaction of sediments, structures, and hydraulics in the coastal zone is required for the effective planning, design and construction of shore protection works.

Work Normally Performed By CERC

CERC compiles, evaluates, and analyzes available data, information, and reports on coastal processes and their interaction with coastal structures in order to glean from them and synthesize current state-of-the-art engineering design methodologies and design criteria.

CERC also collects field data to support project evaluations, to develop techniques for data collection, and to establish design guidelines for coastal works.

Point of Contact

Commander/Director
US Army Corps of Engineers
Coastal Engineering Research Center
Kingman Building
Ft. Belvoir, VA 22060

WRSC-D

DREDGING OPERATIONS AND TECHNOLOGY

Description

WRSC-D has overall management of the US Army Corps of Engineers dredging program. Provides technical assistance in determining type of equipment suitable or available from within Corps dredge fleet or from private industry, scheduling of equipment, effects of environmental restrictions and criteria, historical data and other aspects pertinent to dredging.

Work Normally Performed By WRSC-D

WRSC-D does not normally provide field engineering service, however, it can recommend the sources of such service from the Divisions and Districts. Typical capabilities available are:

a. Suitable dredging equipment or methodologies

b. Historical project dredging data

c. Typical costs and production rates of dredging equipment

d. State of the Art dredging trends

e. Authorized federal projects, funds allotted/ expended

f. Information on Industry Capability Program performance, policies and procedures

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
ATTN: WRSC-D
Kingman Building
Ft. Belvoir, VA 22060

WRSC-C COMMUNICATIONS

Description

Adapt, improve and develop navigation and communications systems. Assist FOA's (Civil Works) in assigning radio frequency and provide general guidance relating to the use of the electromagnetic spectrum and such other matters as higher HQ may direct.

Work Normally Performed By WRSC

Provide a communications/electronic engineer to assist the facilities engineer in developing efficient field communications systems. Primary focus is on:

a. Land-Mobile radio including marine radio navigation and radar

b. Transmission of data from unattended in-site sensors

c. Frequency management

d. User training

Support Planning Information

A. Facility engineer requirement assessment.

B. Work done on a reimbursable basis.

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
Kingman Building
Ft. Belvoir, VA 22060

WRSC-C GRAPHICS SYSTEMS

Description

Adapt, improve and develop information transfer systems applying computer graphics and graphics display capabilities.

Work Normally Performed By WRSC

Provide an engineer to assist the facilities engineer in assessing the feasibility of utilized digital driven graphics systems. Support can be offered in:

a. System design

b. Procurement of hardware

c. Procurement of software

d. Development of data base

e. Facility design

f. Training of user

Support Planning Information

A. Facility engineer requirement assessment.

B. Work done on a reimbursable basis.

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
Kingman Building
Ft. Belvoir, VA 22060

FESA

BUILDINGS AND GROUNDS RPMA SUPPORT

Description

In the Buildings and Grounds RPMA area, FESA is in a unique position for rendering expert advice and assistance or support. FESA is working directly with OCE, the MACOM's various FE's, Districts and Divisions, Engineer Laboratories and several outside agencies such as the National Bureau of Standards. FESA is also represented on several Tri-Service Committees, has access to Information Handling Services, utilizes outside consultants (open-end A/E contracts) and uses highly specialized and sophisticated equipment (infrared cameras). With this background FESA will provide engineering, technical and consultant services in the form of field investigations, studies, analyses, technical reports and recommendations. FESA will also render CITA support by developing and reviewing model or site specific RPMA specifications and statements of work for contracting out, to include special provisions. In addition, FESA will furnish program management expertise on technical development projects and will develop, review or revise technical manuals, bulletins, notes and circulars.

Work Normally Performed By FESA

FESA will provide an experienced engineer or a team of technical personnel to investigate the particular problem in any of the following Buildings and Grounds functions:

a. Buildings (Examples: Infrared roof moisture surveys, paint problems, asbestos problems, roof truss inspections, product information)

b. Stuctures (Examples: Structural analysis, bridge inspection)

c. Pavements and Surfaced Areas (Examples: Drainage and erosion control problems, dust and stabilization problems, automated pavement maintenance and repair management system, i.e., PAVER, nondestructive testing)

d. Railroad trackage

e. Custodial Services

f. Preventive Maintenance

g. Self-help

The results of the investigation will be analyzed and a report will be provided which will document the findings and recommend corrective action.

Also, for the above functions, FESA will furnish CITA (Commercial Industrial Type Activity) support by providing model statements of work or by reviewing site specific statements of work prepared or adapted by the customer. Review comments will include technical and administrative/management observations and recommendations.

Support Planning Information

A. For structural, pavement, and railroad trackage problems, as-built drawings of the facility should be made available. Also, any design notes and historical data on previously accomplished repairs, if any, would be helpful.

B. For infrared roof moisture surveys, in addition to the information listed above, customer will be asked to provide certain logistic (e.g, liquid nitrogen) and manpower support, depending on location and magnitude of project. Survey is subject to weather conditions and requires nighttime work.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

CONSTRUCTION SERVICES

WES

CONCRETING OPERATIONS AND PRACTICES

Description

Concreting operations are normally a large part of most construction projects. Quite often contractors will request approval to use specialized mixtures or techniques or equipment which may not be suitable for a particular job. A concrete specialist from WES is available to advise field personnel on the correctness of the methods employed.

Work Normally Performed By WES

WES will provide an engineer experienced in correct concrete practices to assist in field operations. Specific areas of concrete technology which should be considered are: mixture proportioning, mixing, transporting, placing, consolidating, curing, and testing.

The WES effort will accomplish the following: detailed inspection of the concrete materials and proportions; review of individual concreting systems and methods; and furnish advice to field personnel on correct procedures.

Testing of concrete or construction materials or techniques can be accomplished by WES on request. Recommendations can be furnished in official reports or informally.

Support Planning Information

A. Operations should be as close to normal as possible.

B. Manufacturer's literature should be available for all equipment and proprietary products in use.

C. Concrete test records should be available.

D. Personnel familiar with the operations should be available for consultation.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES CONCRETE MATERIALS EVALUATION

Description

Verification that materials being used by Facilities Engineers actually comply with the stipulated requirements is an important quality assurance (QA) function. Ideally, this verification should be accomplished prior to the materials being incorporated in the work, but at times problems occur later. The WES has the capability to evaluate all concrete construction materials and can generally determine the reason for later occurring problems.

Work Normally Performed By WES

The WES will provide an engineer or senior technician to assist the facilities engineer in establishing a QA program, perform acceptance tests on concrete materials, and evaluate problems to identify the causes. The general categories WES has the capabilities to evaluate include:

a. Cementitious materials (portland cements and pozzolans).

b. Aggregates (fine, coarse, lightweight, heavyweight, etc., including petrographic, chemical, and physical evaluations).

c. Concrete (lightweight, normal weight, heavyweight, cellular, fiber-reinforced, polymer, polymer-impregnated, etc.).

d. Admixtures (AEA, water reducers, retarders, etc.).

e. Waterstops and gate seals (plastic and rubber products).

f. Water.

g. Soil-cements.

h. Masonry units.

Support Planning Information

A. Copy of project specifications should be available.

B. Transportation of materials to laboratory should be available.

C. Access to work area.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

CRREL COLD WEATHER CONSTRUCTION

Description

Types of earth materials and methods of successfully excavating and placing these materials at below freezing temperatures without detriment to the completed structure must be evaluated before and during construction. Where temporary enclosures are used to protect the construction operations at below freezing temperatures, the amount and type of heat loss should be estimated to determine if it is economical to provide an enclosure and continue construction operations at extremely cold temperatures.

Work Normally Performed By CRREL

CRREL will provide engineering guidance and data on frozen earth properties to assist the facility engineer in decisions as to what types of earth materials and at what water contents and temperature ranges these materials can be used safely in construction in below freezing temperatures. In the use of temporary enclosures to protect construction from cold weather, engineering guidance and thermal properties of construction materials will be provided to evaluate the sources of heat losses (i.e., conduction, infiltration or radiation) and heat requirements for the enclosure during construction. Using an existing computer program, the facilities engineer will be assisted in deciding which types of enclosure materials are to be used and what is the best configuration of the enclosure.

CRREL has the capability to evaluate:

a. Strength and other mechanical properties of frozen and thawing earth materials.

b. Thermal properties of frozen and unfrozen earth materials.

c. Climatological data in cold regions with respect to construction activities.

d. Heat losses for different types of temporary enclosures for construction.

Support Planning Information

A. Plan of the project and time schedule.

B. Transportation of materials to be tested to the laboratory.

C. Access to work area if required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL CONSTRUCTION SITE SELECTION

Description

Site selection methods vary depending on the scope and objectives of a project. Personnel at CRREL have performed theoretical and field research on the use of remotely acquired imagery and a range of geophysical techniques that can be applied to some site evaluation tasks. In general these methods can help to provide information on the distribution of surface materials as well as variations in material properties at depth. CRREL has the capability to evaluate the usefulness of various remote sensing techniques for solving specific problems, analyze the data they produce, and predict the cost effectiveness of various approaches.

Work Normally Performed By CRREL

CRREL can provide either consultations or direct field assistance in the selection or use of the techniques listed below to assess proper matching of the method with the problem. Assistance can also be provided in evaluation of the data. Depending on the particular requirement, service could be provided by either a geologist, Research Geophysicist, Research Civil Engineer or Senior Technician. Specific geophysical exploration methods in which CRREL's expertise lies are the following:

a. Satellite and aircraft imagery.

b. Airborne Side Looking Radar.

c. Ground or Helicopter based impulse radar.

d. Ground or Airborne magnetic induction resistivity methods.

e. Ground or airborne plane wave resistivity methods.

f. Ground based galvanic resistivity surveys.

g. Ground based magnetometer surveys.

Additional information could be provided on drilling and sampling techniques as well as laboratory analysis of samples for engineering property determinations.

Past studies have included mapping of superficial deposits, subsurface variation in materials, permafrost and ground ice mapping, and determination of electrical properties of materials.

Support Planning Information

A. General geological description of anticipated location with any available information as to material types and their properties.

B. General physical description of anticipated site including location of manmade structures.

C. Information on nature of construction project, including anticipated material requirements.

D. If on site work or other direct involvement in field or laboratory activities is required some provision for support would be required. The nature of that support naturally depends on degree of involvement.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CERL CONSTRUCTION MANAGEMENT

Description

Effective construction management requires thorough knowledge in many areas. The needed expertise for the problem at hand may not always be available in the FE's staff. The Construction Engineering Research Laboratory (CERL) has the capability to provide assistance to the FE in several of the more frequently experienced problem areas.

Work Normally Performed By CERL

CERL will provide an engineer, technician, or pertinent literature as required to assist the FE on construction management problems related to the following:

a. Selecting the proper contract type for the project.

b. Microprocessor application to CPM schedule analysis.

c. Handling of modifications and claims.

d. Evaluating the impact of contract modifications on the unchanged work.

e. Estimating the cost of equipment.

Support Planning Information

A. Complete definition of the problem by the FE or his representative.

B. Access to all contract documents, the work area, and all personnel involved in contract management and/or administration.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CRREL SNOW LOADS ON STRUCTURES

Description

New snow load design criteria have been developed recently by CRREL for OCE. Guidance shows the importance of geometric, aerodynamic and thermal characteristics of roofs on resulting snow loads. When insulation is added to an existing roof or solar collectors are installed on a roof, snow loads can change significantly. This fact plus the questionable value of some snow load design criteria used in the past suggests that snow load carrying capacity of existing buildings be evaluated, especially if they are to be modified.

Work Normally Performed By CRREL

1. Assist in the use of new snow load design criteria recently distributed by Engineer Technical Letter (ETL).

2. Provide advice and assistance on snow drift loads, rain-on-snow loads, eave icings, sliding snow, etc.

3. Conduct special investigations, such as snow drifting studies in a flume, for critical or unusual structures.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research And Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

SPECIAL STUDIES & SURVEYS

WES PAVEMENT INVESTIGATION

Description

The Pavement Systems Division (PSD), Geotechnical Laboratory has the capability of conducting detailed field and laboratory investigations of rigid and flexible pavements. The PSD has a materials testing facility that can do specification testing or investigative studies on bituminous material, aggregates, bituminous mixes including mix designs, joint sealing materials, stabilized foundation layers, and other special paving products such as, pavement rejuvenators and heater remix paving processes. The PSD has the capability of conducting prototype load testing on test sections or on existing pavements. Prototype testing is accomplished with the desired loads, gear configurations, tire pressure, etc. In addition, PSD can furnish construction and help with construction problems as they arise. The evaluation of existing pavements for load carrying capacity can be carried out in a number of different ways. Evaluation of an overall pavement system can be done best by nondestructive procedures and methodology. If a more detailed evaluation to a particular condition is desired, then testing can be accomplished either in test pits or through small core holes.

The PSD has the capability for helping develop technical provisions for pavement construction and maintenance contracts and reconstructing maintenance procedures for deteriorated pavements.

Work Normally Performed By WES

The PSD provides technical research personnnel and testing facilities to conduct the necessary investigations which lead to the final guidance documents for pavement maintenance and repair techniques.

Support Planning Information

User problems/requirements must be made known to WES and priorities established regarding need for study.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

SOIL STABILIZATION

Description

Research is performed to develop materials or methods capable of efficiently and rapidly stabilizing weak, wet soils to provide emergency roads and airfields in support of military operations in problem areas. Two principal methods are employed: mechanical means, whereby soil properties are improved by compaction or use of membrane-encapsulated soil layers and/or membrane-grid systems; and additive techniques whereby certain chemicals are admixed into the soil to achieve the desired improvement. Laboratory investigations are performed to determine the ability of potential stabilizing materials and formulations to meet specific requirements, to study physical and chemical factors influencing the effectiveness of a stabilizer system, to examine the effects of variables (moisture content, density, compaction, cure time, etc.) on behavior of stabilized soil, and to establish mix-design specifications for field application of a stabilizer.

Work Normally Performed By WES

The GL provides technical research personnel and testing facilities to conduct the necessary investigations which lead to the final guidance document for stabilization of problem soils.

Support Planning Information

User problems/requirements must be made known to OCE FE and priorities established regarding need for study.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES MATERIAL PERFORMANCE CHARACTERISTICS IN MAINTENANCE AND REPAIR FOR PAVEMENTS

Description

The study is directed toward the development of improved maintenance and repair techniques for (military) pavements. The approach is to address specific user needs by determining deficiencies in present capabilities, applying existing technology where possible, and developing new technology to ensure requirements are met. Deficiencies in capabilities will be confirmed from user input and field inspections. Baseline surveys will indicate existing technology available for application. The information obtained will be reported on fact sheets for individual materials/techniques which will be distributed to Army facilities for inclusion in the Surface Areas Material Utilization Catalog (SAMUC).

Work Normally Performed By WES

The GL provides technical research personnel and testing facilities to conduct the necessary investigations which lead to the final guidance documents for pavement maintenance and repair techniques.

Support Planning Information

The study is funded by DAEN-FEB-P, OCE, and contact is maintained in regards to user requirements.

User problems/requirements must be made known to OCE FE and priorities established regarding need for study.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES

REMOTE SENSING

Description

The management objectives specified in AR 420-74 "Natural Resources - Land, Forest, and Wildlife Management", AR 210-20, "Master Planning for Army Installations," and AR 200-1 "Environmental Protection and Enhancement," require the Facilities Engineer to have available for his review environmental data, often very specific data, on the vegetation, surface geometry, soils, hydrology, wildlife habitat, and cultural features present within his facility. The synoptic view and the advantages of using repetitive coverage to monitor change make remote sensing a primary environmental data gathering tool for characterizing the environmental conditions at a facility. Three remote sensing methods - airborne photographic, airborne digital scanner, and satelliteborne scanner - have provided the means of acquiring environmental data as demonstrated in several WES studies.

Work Normally Performed By WES

The WES can provide a team of engineers, life scientists, and technicians with a diversity of experience in acquiring environmental data for management purposes. The team will provide the required environmental data by applying the following six essentially sequential processes:

a. Problem specification (what is the problem? what kinds of information are needed to solve it? and can a remote sensing system obtain any or all of the needed information?).

b. Acquisition of ground control data (determination of how the things of interest are related on the ground in selected locations, to serve as a basis for interpreting those relations over the entire time and region of interest).

c. Data acquisition with a remote sensing system (the actual process of sensing and recording data on the region of interest at the time of interest).

d. Data manipulation (putting the information obtained by the remote sensing system into a form suitable for analysis and/or interpretation).

e. Information extraction (actually performing the analysis and/or interpretation to obtain the needed data from the product of the remote sensing system).

f. Information presentation (putting the extracted data into a form that can be used to assist in solving the problem at hand).

Support Planning Information

The information required from the Facilities Engineer will depend on the type of problem and the degree of assistance requested. Normally the following information would be required:

a. Statement of problems and desired end products.

b. Copies of the master plan, land management plan, forest management plan, wildlife management plan, and outdoor recreation plan for the facility.

c. 1:24,000 scale USGS topographic maps or 1:25,000 scale Army orthopicto maps of the entire facility.

d. SCS soil surveys for the facility.

e. List of available aerial photography of the facility.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WRSC-C

REMOTE SENSING

Description

Adapt, improve and develop methods of applying remote sensing technology to data collection activities.

Work Normally Performed By WRSC-C

Provide personnel to assist the facilities engineer in evaluating the potential of remote sensing technology. The general process includes:

a. Assess operational requirements

b. Identify potential sensor systems

c. Plan acquisition

d. Assess performance

e. Coordinate user training

Support Planning Information

A. Project specifications

B. Access to project site

C. Work done on a reimbursable basis

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
Kingman Building
Ft. Belvoir, VA 22060

WES PERIMETER SECURITY

Description

Several perimeter security systems are available to the Facilities Engineer - television, infrared, electrostatic, microwave, fence disturbance, and buried line sensors. The performance of buried line sensors is affected by several environmental factors including soils, vegetation, weather, and topography.

Work Normally Performed By WES

The WES can provide a team of engineers and technicians with experience in evaluating the performance of buried line sensors under varying environmental conditions. Specific factors investigated will include:

a. Detection distance as a function of:

(1) Soil rigidity
(2) Soil moisture
(3) Depth of burial
(4) Layered media

b. Sensor performance as a function of cable size and construction.

c. Sensor performance under varying weather conditions (the WES has developed an automatic meteorological data recording system).

The team can prepare a report which identifies methods of increasing sensor performance under varying environmental conditions, results of special tests, and recommendations for cable construction and placement.

Support Planning Information

The information needed from the Facilities Engineer will include:

a. Proposed sensor location.

b. Type of sensor to be used.

c. 1:24,000 scale USGS topographic or 1:25,000 scale Army orthopicto maps.

d. Detection distance required.

e. SCS soils surveys of the installation.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES CAMOUFLAGE

Description

Camouflage of military facilities is a Facilities Engineering activity that is constantly in a state of change. The use of various recently developed remote sensors has made older techniques and materials obsolete. However, the new techniques and materials developed to counter these sensors have often been incompletely evaluated leaving the Facilities Engineer with questions as to the best camouflage approach to use.

Work Normally Performed BY WES

The WES can provide the following tests, analyses, and recommendations:

a. Evaluation of the ability of state-of-the-art techniques and materials to solve the camouflage problem.

b. Field test of several techniques and/or materials to verify the effectiveness of the camouflage.

c. Recommendations as to the most cost-effective technique and/or material which will produce the desired camouflage.

Support Planning Information

A. Statement of problems and desired products.

B. Lists of the types of buildings, structures, or other military features to be camouflaged.

C. 1:24,000 scale USGS topographic maps or 1:25,000 scale Army orthopicto maps of the facility.

D. List of available aerial photography of the facility.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES LOCATION OF ROOF LEAKS

Description

The repair of leaks in roofs is difficult because often the moisture visible at point in the ceiling below originates at a roof location remote from that point. This has resulted in the replacement of entire roofs at great cost at most facilities. The WES has developed a technique using high resolution infrared scanners to identify the roof locations where leaks have occurred and the extent of roof damage.

The WES technique will provide the Facilities Engineer with a product that identifies the overall magnitude of the roof leak problem at his facility.

Work Normally Performed By WES

Tasks performed include:

a. Planning and supervising the optimal time, film/filter combination and altitude of the remote scanning mission.

b. Contracting the remote scanning mission.

c. Analysis of the film.

d. Identification of the roof locations where leaks have occurred and the extent of roof damage.

Support Planning Information

A. Aerial photography of the cantonment area.

B. As-built roof construction specifications.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES ENDANGERED SPECIES

Description

The Endangered Species Act of 1973 and several subsequent Executive Orders require the Facilities Engineer to determine whether endangered species or endangered species habitats occur on his installation. In addition, he must determine whether his proposed actions will adversely affect an endangered species or its habitat. The WES has addressed these problems in two ways: (1) WES has prepared a list of Federal and state protected species that may be expected to occur on major Army installations and activities based on their historic range and (2) prepared narrative accounts on the habits and habitat requirements of selected species. The Facilities Engineer can use the lists to alert his planners to the possible presence of a protected species and, by reviewing the habitat data, determine whether the environment on the installation is suitable for the species.

Work Normally Performed By WES

Although the lists of species are complete and current the narrative accounts are not, therefore, the Facilities Engineer can request that narrative accounts be prepared for species that may occur on his installation. In addition, the WES can and has conducted inventories of habitat types on an installation and can identify and map potential habitats for endangered species based on their reported habitat requirements.

Support Planning Information

The information required from the Facilities Engineer will depend on the type of endangered species problem and the degree of assistance requested.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

WES EROSION CONTROL

Description

Military facilities often have severe problems with wind and water erosion due to the intense vehicle and troop training activities conducted on the facility. These activities destroy vegetation, alter drainage patterns, and disturb the exposed soil surface which contribute to increased soil erosion. The WES has recently conducted a study of soil erosion problems at Fort Carson, Colorado, to provide basic data and conservation and restoration measures.

Work Normally Performed By WES

The WES can provide a team of engineers, life scientists, and technicians with a diversity of experience in erosion control. The team can provide direct support to the Facilities Engineers in the following areas:

a. Identification and mapping the extent of the erosion problem on the facility.

b. Evaluation of the effectiveness of the facilities erosion control program.

c. Field testing of alternative erosion control methods.

d. Analyses of effectiveness of the alternative methods.

e. Recommendation of the most cost-effective erosion control method that could be expected to produce the desired control.

Support Planning Information

The information required from the Facilities Engineer will depend on the type of problem and the degree of assistance requested.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

FESA POWER PLANT INSPECTIONS

Description

Power plant inspections are objective steps in development of an efficient and reliable facility by identifying systems and components needing repair, testing, or replacement. The power plant inspection will normally include the plant's outdoor substation(s) and/or switchyard.

Work Normally Performed By FESA

FESA will provide a team of engineers and technicians experienced in all phases of power plant operations and maintenance. Although each power plant and its inspection requirements may be different, the FESA team will accomplish the inspection by the following methods:

a. Detailed inspection of equipment, review of maintenance records of individual systems and components, and discussions with plant personnel of operating characteristics of equipment.

b. Observation of practices and procedures used and comparison with other facilities whose records show excellent performance and accepted preventive maintenance standards.

Tests and repairs determined to be necessary as a result of the inspection can be accomplished by FESA upon request. Such tests and repairs will be thoroughly documented to reflect as-found conditions, corrective actions, and as-left conditions to include test and calibration forms which may be used in support of the adequacy of the system or its components.

Support Planning Information

A. Plant operations should be as close to normal as possible.

B. Scheduled outages should be possible.

C. As-built drawings and manufacturer's literature should be available for all systems and components.

D. Plant logs and operating/maintenance histories should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

LOCATION OF UNDERGROUND HEAT DISTRIBUTION PIPES

Description

Underground Heat Distribution Pipes, even when in conduit, heat up the surrounding ground. Sensitive, high resolution infrared scanners can detect this heat and thus the trace of the pipeline can be determined.

Work Normally Performed By FESA

FESA will provide a team of technicians familiar with the operation of the IR equipment who will mark the trace of the pipe. The location of a leak in a conduited line cannot be determined using IR viewing equipment.

Support Planning Information

A. Pipes must be heated.

B. As-built drawings, even though known to be incorrect, should be available.

C. Survey normally requires the use of a 'bucket' truck provided by the customer.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

LOAD AND POWER FACTOR ANALYSIS

Description

Load and power factor analysis includes studying the locations and the types of electrical loads and the power factor presented to the facility in order to determine the economic feasibility of correcting a low power factor.

Such study should be considered when the installation is subject to a power factor penalty in the electrical energy billing.

Work Normally Performed By FESA

FESA would provide a team of an electrical engineer and a technician to make recordings of the reactive power being consumed at various locations on the system and to study the make up of the electrical loads in order to determine the most economical method of power factor correction. The economic benefits of power factor correction would be analyzed in terms of reduced utility charges and increased system capacity against the installation and maintenance costs of power factor correction devices.

FESA Support Planning Information

A. The customer should supply information on electric utility billing for at least a year prior to the study.

B. The customer should provide an electrician to assist in making the field survey.

C. The customer should provide the available single-line diagrams and distribution maps which would be helpful in making the load survey.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

CIRCUIT BREAKERS AND PROTECTIVE DEVICES

Description

Circuit breakers, protective relays, and other electrical protective devices need periodic maintenance, repair, adjustment and calibration to assure system integrity. Should any electrical system protective device fail to function properly, loss of life or property may follow. AR 420-43 requires circuit breakers and relays be calibrated biennially.

Work Normally Performed By FESA

FESA will provide skilled personnel to remove, disassemble, repair, reassemble, adjust and calibrate circuit breakers, protective relays, automatic circuit reclosers and other protective devices. FESA will supply such specialized test equipment as:

a. Multi-Amp Model CB7150, Circuit Breaker Test Set

b. Multi-Amp Model SR-51, Relay Test Set

c. Multi-Amp Model CS-7A, Phase Shifter Unit

d. 500 VDC Megohmmeter

e. Multi-Range Portable Ammeters and Voltmeters

A report will be provided which contains as-found conditions which would have interferred with device operation, corrective measures, and the as-left condition. In addition, the report will contain the results of the testing and calibration of each component to facilitate establishment of a calibration history.

Support Planning Information

A. Maintenance and calibration should be performed at intervals not exceeding 24 months.

B. Customer should have fault current analysis and coordination study available for use.

C. Customer should have manufacturer's literature available for use.

D. Outages should be available on schedule.

E. Customer should arrange for emergency procurement of repair parts.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

SYSTEMS SHORT-CIRCUIT ANALYSES AND PROTECTIVE DEVICES COORDINATION STUDIES

Description

The electrical system short-circuit analysis and relay coordination study serves the following purposes.

a. Assures that interrupting devices (breakers, fuses) are capable of interrupting fault currents without major damage to either the interrupting devices themselves or equipment where the fault occurred.

b. Assures that only the breaker nearest to the fault opens, thus limiting the power outage to the smallest possible area.

c. Assures that all equipment is properly protected in accordance with the National Electrical Code.

Breaker and relay calibrations are required every two years in accordance with AR 420-43. Relay or circuit breaker settings must be based on engineering analysis of the distribution system. If an analysis or study does not exist, or if there have been major changes to the system since the last study, a new study is required.

Work Normally Performed By FESA

FESA will assign a qualified electrical engineer designated as "Project Engineer" for each task. The Project Engineer will visit the facility to coordinate with local personnel and identify inadequacies in the electrical distribution system. He will recommend necessary design improvements to upgrade the system.

FESA will also provide a team to collect the distribution system data. The gathering of system data will consist primarily of researching the available drawings and checking nameplate information on various components of the distribution system.

Although each study can be tailored to individual needs, the following items are usually included in a final report:

a. Complete single-line diagram.

b. Short-circuit analysis, including fault current levels, identification of deficiencies in interrupting capacity and recommendations for corrective action.

c. Recommendations for adjustments and changes to the system to improve system coordination (selective operation of protective devices).

d. Coordination curves (time-current characteristics) including transformer in-rush and ANSI points and minimum and maximum fault current values.

e. List of assumptions and design parameters; supporting tables and charts of vital technical data.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

J-SIIDS

Description

Joint-Services Interior Intrusion Detection System (J-SIIDS) was fielded for detection of unwarranted entry into controlled areas such as arms rooms. FESA can provide troubleshooting service for J-SIIDS problems requiring specialized equipment and expertise beyond FE capability for routine maintenance.

Work Normally Performed By FESA

FESA will provide skilled technicians and specialized test equipment to troubleshoot and repair installed J-SIIDS systems. In some cases, the source of problems may be in the link between the transmitter and receiver. In such cases the problem will be documented for correction by signal support authorities.

Support Planning Information

The following should be available to support the troubleshooting and repair effort:

a. Replacement modules.

b. As-built drawings.

c. Access to all J-SIIDS transmitters and receivers.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA ELECTRICAL SYSTEM IR SURVEY

Description

Infrared survey techniques, applied to interior and exterior electrical distribution systems, provide a fast evaluation of the system's condition. Using infrared surveying requires no system outage and very little manpower commitment.

Work Normally Performed By FESA

FESA will provide the survey technicians and IR instruments. Although each mission content is tailored to meet the specific need of the requester, the following items are usually included in the survey:

a. Substations
b. Pole Top Disconnects
c. Line Terminators
d. Fused Cutouts
e. Line Splices (overhead and underground)
f. Knife Disconnects
g. Transformers
h. Service Entrance Terminations
i. Panelboards
j. Switchboards

The survey results will be a report from FESA when job is completed and electrical shop prints annotated with "Hot Spot" location and description. These prints will be marked up by the survey team and left on-site to support the installations follow-up maintenance.

Support Planning Information

A. Survey should be conducted at system loads of 70% or higher for optimum results.

B. Customer should provide an electrician with current prints to accompany the survey team.

C. Survey normally performed during late evening/ nighttime hours.

D. Neutral connections must still be maintained by mechanical means.

E. Survey cannot be performed in rain.

F. Photographs of survey results available for before and after documentation upon request.

Point of Contact

Commmander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

CORROSION CONTROL AND INSPECTION SURVEY

Description

Corrosion related problems require approximately 15% of the facilities engineer's labor and materials cost and 17% of the total contract effort. A comprehensive corrosion survey of soil conditions, water chemistries and general corrosion problems can predict problem areas, provide data for solving problems, and assess extent of current problems for funding action. System downtime and finances can be programmed in advance to avoid emergency breakdown and repair situations.

Work Normally Performed By FESA

FESA will provide a corrosion engineer, team of technicians, and test instruments to perform complete analyses to determine corrosion in soil, water, steam and gas piping, structures, and buildings. The specific corrosion testing varies according to the need of the installation; however, the following services can be provided:

a. Chemical analysis of potable water, heat distribution water, boiler water, condensate, and air conditioning cooling water to determine scaling and corrosion tendencies.

b. Inspection and testing of cathodic protection systems (water tanks and underground piping).

c. Determination of soil resistivities and structure evaluate corrosive natures of soils or waters.

d. Inspection and identification of causes of internal and external pipeline and structure corrosion.

e. Corrosion problem investigation and analyses.

The survey results will be a report from FESA after the survey identifying observed conditions; recommending water treatment procedures, chemicals, and equipment, to improve

corrosion and scaling resistance; providing cathodic protection and pipeline corrosion "hot spot" protection designs; and recommending protective coatings.

Support Planning Information

A. Systems should be as near normal operation as possible.

B. Periods of abnormal dryness or excessive rainfall should be avoided for soil measurements, if possible.

C. Customer should provide an electrician for locating and testing cathodic protection systems.

D. Most of survey cannot be performed in rain.

E. Customer should provide one or two vehicles for on-post transportation of team and equipment.

F. "As-built" drawings and manufacturer's literature for systems and components should be available.

G. System operating and maintenance logs should be available.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

ELECTRICAL SYSTEMS : GENERAL TROUBLESHOOTING AND FAILURE INVESTIGATIONS

Description

The following are typical problems which could be investigated by FESA:

a. Repeated failures or nuisance operations of protective devices.

b. Excessive energy consumption which cannot be explained.

c. Causes of electrical fires.

d. Unexplainable damages associated with short-circuit faults.

e. The presence of harmonics producing undesirable effects.

f. Unreasonable fluctuations of voltage or frequency.

g. Unreliable performance of an uninterruptible power system (UPS) or emergency engine-generator system.

Work Normally Performed By FESA

FESA will provide a team of an engineer and technician(s) to investigate the particular problem. Typical action would include making recordings of the electrical quantities (kW, kVA, kvar, volts, amps, or frequency) involved at various locations and analyzing the results. The team would also make a thorough inspection of the system to pinpoint the cause of the problem. A final report will be provided which will document the findings and recommend corrective action. Corrective action may include a proposed design change. In the case of a minor change the detailed design could be provided by FESA.

Support Planning Information

A. The customer should be prepared to provide complete information concerning the history of the problem with as much support data as possible (load readings, outage reports, voltage readings, records of complaints, etc.)

B. The customer should be prepared to provide engineering drawings of the power system.

C. The customer should provide someone who is familiar with the system and the problem, and who is able to provide access to all equipment, preferably an electrician.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvior, VA 22060

FESA

METERING

Description

Metering of electric power demand, of fuel and steam flow, and of the environmental parameters provides a method to determine the rate and quantity of energy usage, a means to control energy consumption, and the basis for establishing energy consumption efficiencies of Army facilities. Expansion of existing metering is often required to better monitor the use of energy throughout these installations.

Work Normally Performed By FESA

FESA has developed experience in the design and installation of metering for energy consumption investigations at several Army installations. This experience could be utilized in the initial planning of projects that require metering of energy consumption.

FESA can provide engineering support and technical advice in the following areas:

a. General guidance on types and application of metering on energy systems.

b. Cost estimates and economic analysis of proposed metering schemes.

c. Develop specifications for detailed design.

Support Planning Information

The information needed for proper engineering support of projects will depend on the type of task and on the degree of assistance requested. Normally, the following information would be required:

a. Statement of problems and desired end results.

b. Copies of proposals and conceptual design.

c. Existing drawings of systems being modified.

d. Data on energy consumption profiles and costs.

e. For review, copies of developed specifications and equipment procurement documents.

Point of Contact

Commander/ Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

MECHANICAL SYSTEMS : GENERAL TROUBLESHOOTING AND FAILURE INVESTIGATIONS

Description

The following are typical problems which could be investigated by FESA:

a. HVAC control systems problems.

b. Excessive mechanical equipment energy consumption which cannot be explained.

c. Analysis of excessive vibration and noise in mechanical equipment and failures due to excessive vibration.

d. Unreliable operation and excessive maintenance requirements of mechanical equipment.

Work Normally Performed By FESA

FESA would provide a team of an engineer and technician(s) to investigate the particular problem. Typical action would include making recordings of vibration frequency, magnitude and phase and analyzing this data to determine cause of vibration and make recommendations as to how the vibration can be reduced. Or, for HVAC system problems, the team would make a thorough inspection of the system, verify proper operation of major components, and pinpoint the cause of the problem. A final report will be provided which will document the findings and recommend corrective action. Corrective action may include a proposed design change; in the case of a minor change the detailed design could be provided by FESA.

Support Planning Information

A. The customer should be prepared to provide complete information concerning the history of the problem with as much support data as possible (maintenance records, records of complaints, etc.).

B. The customer should be prepared to provide engineering drawings of the system under study.

C. The customer should provide someone who is familiar with the system and the problem, and who is able to provide access to all equipment.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

PRESENTATIONS OF ENERGY SEMINARS, WORKSHOPS, AND CONFERENCES

Description

Upon request from OCE, MACOM, or subordinate command, FESA will prepare and conduct a seminar, workshop, or conference on energy conservation, management and/or technology as related to FE activities. The topics covered should be those of interest to FE personnel command wide.

Work Normally Performed By FESA

A. Based on the topic of interest supplied to FESA, a program of instruction (POI), lesson plans, agenda, and schedule will be drafted. Also, appropriate instructional materials will be prepared and reproduced for distribution to attendees.

B. FESA will normally supply all speakers; however, if speakers are not available in FESA to present instructional materials, FESA will arrange for speakers knowledgeable in the subject. FESA may also request speakers from the requesting command to discuss policy, planning, technical, and/or funding problems peculiar to that command.

Support Planning Information

A. The requesting command shall supply to FESA guidance on the overall objective of the conference and indicate the extent of support available in preparing and reviewing POI, lesson plans, and schedules.

B. The requesting command should assist in the development of a list of attendees and may be required to forward invitations to prospective attendees. FESA will give guidance as to maximum attendance at workshop, seminar, or conference.

C. FESA will supply guidance and direction in obtaining conference facilities. The requesting

command is expected to provide assistance in making arrangements for facilities and logistical support.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA ENERGY CONTROL SYSTEMS

Description

"Energy Control Systems" (ECS) consist of equipment that monitor and/or control energy use in a particular building or group of buildings. These systems can be used to conserve energy and reduce costs. ECS vary from simple local controls, such as time switches, to sophisticated systems that use computer programs to monitor and control energy use and equipment operation.

Work Normally Performed By FESA

FESA will provide engineering support and technical advice in the application of ECS systems. The type and scope of support provided is tailored to meet the specific need of the requester. The following are areas where FESA can provide assistance:

a. Economic analysis of specific applicability of automation systems.

b. Type of system to utilize.

c. Selection of control and/or monitor points.

d. Review of system purchase specifications and proposals.

e. Assistance in system acceptance testing and inspection.

f. Review design of modifications of existing hardware and systems.

g. Review control strategies.

Support Planning Information

The types of support planning information required

depends greatly on the scope of assistance requested. The following types of information are generally required:

a. Drawings of building(s) and facilities including the HVAC systems.

b. Copies of A/E proposals and/or purchase specifications.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

EVALUATION OF TOTAL AND SELECTIVE ENERGY SYSTEMS

Description

Total energy (TE) systems provide all of the electricity and heating or cooling required by a facility. The electricity is generated on-site and the waste heat recovered and used for heating domestic hot water, tempering outdoor ventilation air, cooling with absorption refrigeration, space heating or producing process steam. Selective energy (SE) systems utilize an optimum base loaded combination of on-site electrical generation and waste heat utilization. These systems require off-site power for meeting peak electrical demands.

Work Normally Performed By FESA

FESA will provide engineering support, including computerized analysis and technical advice in the application and evaluation of total and selective energy systems. The type and scope of support provided is tailored to meet the specific requirements of the requester. The following are areas where FESA can provide assistance:

a. General guidance on applicability of TE and SE systems.

b. Types of systems to utilize.

c. Economic analysis of systems.

d. Technical review of procurement specifications and proposals.

e. Assistance in acceptance testing and inspection.

Support Planning Information

The type of support planning information required depends greatly on the scope of assistance requested. The following types of information are generally required:

a. Copies of A/E proposals and conceptual designs.

b. Building and/or facility hardware and envelope data.

c. Building and/or facility energy consumption and usage pattern i.e. load profiles.

d. Fuel types and prime movers desired.

e. Copies of documents to be reviewed.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

ENERGY CONSERVATION ASSISTANCE AND IDEAS

Description

The gap between national energy supply and demand and the resulting escalation of operating costs currently being experienced cannot be reduced or eliminated without a concerted and continuous effort to reduce the national energy consumption through the application of conservation practices. Buildings consume for heating, air conditioning, lighting, and power more than 33% of all energy used in the United States. Reducing energy used in all buildings by 30% without impairing the indoor environment is a realistic possibility. The US Army owns a consideraable number of buildings, and energy conservation in these structures is an imperative goal.

Work Normally Performed By FESA

FESA will provide engineering support and technical advice in the field of energy conservation. The type and scope of support provided is tailored to meet the specific needs of the requester. FESA will furnish required tools and instruments. The following are typical areas where FESA can provide assistance.

a. Economic analysis of modifications to building envelope to reduce energy consumption: for example, installation of solar shading devices on windows, reduction of total window area, and/or increase insulation thicknesses in walls and ceilings or roof.

b. Study and evaluation of HVAC systems to determine cost effective modificatons to equipment or control systems or strategies; for example, installation of time controllers, reduction of outside air intake, and/or night setback of thermostat.

c. Combustion analysis of boilers to insure optimum burner efficiency. Also, analysis of boiler plants and process equipment to reduce process steam consumption.

d. Preparation of energy consumption profiles of specific facilities or portions of the installation.

Support Planning Information

The type of support planning information required depends greatly on the scope of assistance requested. The following types of information are generally required:

a. Building drawings.
b. HVAC system drawings.
c. Building energy consumption data.
d. Boiler and processes equipment drawings and fuel usage records.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

BUILDING LOAD ESTIMATING COMPUTER PROGRAMS

Description

FESA presently utilizes building simulation computer programs to calculate heating and cooling loads. Either ECUBE (Energy Conservation Utilizing Better Engineering) or BLAST (Building Load Analysis and System Thermodynamics) can be used to simulate changes to building envelope, HVAC equipment, and/or equipment control strategies. Total energy analyses can also be performed on either of these programs.

Work Normally Performed By FESA

FESA will provide assistance to the requester in compiling input data necessary to complete the computer analysis. FESA will run program and forward results to requester.

Support Planning Information

Usually the requester prepares the input data on preprinted input sheets which are then forwarded to FESA for key punching and running on the computer. FESA will provide instruction manuals and guidance on preparing input data.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

FESA

IR INSPECTION OF INSULATED, FLAT, BUILT-UP ROOFS FOR LEAKS

Description

Infra-red surveys of insulated, flat, built-up roofs indicate places where there are abnormally high temperatures. In many instances these anomalies indicate water in the insulation.

Work Normally Performed By FESA

FESA will provide the survey Engineer and Technicians and IR instruments. The report from FESA will include both the IR results and a completed visual "Annual Roof Inspection Report".

Support Planning Information

A. Survey not can be done whenever there is snow or standing water on the roof.

B. Customer must provide layout points of the roofs of the buildings in question.

C. IR survey will be performed between 9 P.M. and 1 A.M.

D. Visual inspection will occur during normal duty hours.

E. Customer must provide ladders or other provisions for getting onto the roofs.

F. Where requirements are extensive, an aerial IR study may be made prior to the use of hand-held instrumentation.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

CRREL THERMAL ENERGY STORAGE

Description

CRREL can evaluate thermal energy storage systems for load leveling applications involving single buildings or groups of buildings. Both sensible and latent heat systems can be addressed.

Work Normally Performed by By CRREL

Identification of the lowest cost alternatives for solar and non-solar applications. CRREL can evaluate the proposed storage schemes and determine economic storage capacity. Heat exchange to and from storage, including latent storage schemes, can also be addressed.

Support Planning Information

All the necessary data on the facilities to be served is required. This may include load characteristics of the system. Access to the facilities and adjoining system will be required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Region Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

COLD WEATHER PERFORMANCE OF WINDOWS

Description

Control of condensation and air leakage are important keys to achieving satisfactory performance of windows in cold regions. CRREL has evaluated the performance of various types of windows at facilities in the Northeast and in Alaska.

Work Normally Performed By CRREL

CRREL can provide advice and assistance to facility engineers who are planning window replacements. Where unusual problems are encountered, in-place evaluation of windows can be conducted using an infrared camera and a window pressurization apparatus. Full scale laboratory studies in the CRREL cold room complex are also possible.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL HEAT LOSS MEASUREMENT

Description

Devices are available to measure the in-place thermal resistance of building components. Research has shown that instantaneous readings are of little value. However, measuring a building's heat flow for several hours and conducting an infrared survey during that period to show variabilities in insulation over the building envelope can define the in-place thermal resistance of buildings reasonably well. Controlled laboratory experiments of alternative methods of retrofitting existing facilities are also valuable.

Work Normally Performed By CRREL

CRREL can advise on the conduct of qualitative infrared surveys (Marshall) and quantitative heat flux meter/infrared surveys (Flanders). Should unusual circumstances arise, CRREL personnel may visit the site and obtain thermal measurements. The large panel thermal/moisture test facility and other equipment at CRREL can be used to evaluate insulation retrofit alternatives.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

ROOFS

Description

Maintenance and repair of conventional bituminous built-up roofs often constitutes a significant portion of a Facility Engineer's annual budget. Normally roof problems are directly related to leaks but leaks are difficult to locate visually. CRREL has developed a method whereby wet roof insulation can be detected by infrared scanners. This method is greatly reducing roof repair costs by directing repairs to problem areas only.

Because a high percentage of built-up roofs fail prematurely, CRREL has kept abreast of developments in alternative roofing systems and has monitored the performance of some new systems and various retrofit alternatives. The protected membrane system is an alternative we have studied in some detail because of its suitability in cold regions.

Work Normally Performed By CRREL

CRREL can provide advice and assistance in developing roof moisture surveys. We are in the process of training Army teams to conduct routine roof moisture surveys at Army facilities. Where unusual roofs are encountered direct CRREL involvement in the survey is also possible.

CRREL can provide consultation on roofing problems associated with new construction and existing facilities. We are quite interested in developing improved methods of increasing the insulating and waterproofing ability of existing roofs.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

CENTRAL HEAT DISTRIBUTION SYSTEMS

Description

Large losses of heat can be encountered in thermal distribution systems. CRREL has the capability to evaluate these losses and provide recommendations for improvement. The effects of thermal losses on the environment can also be determined.

Work Normally Performed By CRREL

CRREL will provide a detailed analysis of the heat losses of a central heat distribution system. Above or below ground systems can be studied. Freezing and thawing problems can also be addressed. Small and large scale testing can also be conducted, if warranted.

Support Planning Information

Complete specifications on the system, including any modifications, will be necessary. The systems configuration, operating conditions, and surruonding environmental data will be needed. Access to the system and this information will be necessary.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

HEAT PUMP SYSTEMS

Description

Heat pumps can be used to supply heat for space heating and other heat loads. CRREL can analyze proposed heat pump applications and give estimates of actual performance.

Work Normally Performed By CRREL

If an application has been proposed for a heat pump system CRREL can study in detail the feasibility of the application. The actual coefficient of performance and the seasonal performance factor of the proposed system can be estimated. Operating costs and overall impact on energy resources can also be estimated.

Support Planning Information

CRREL will need to know the specifics of the proposed application. Characteristics of the load will also be required. Access to the proposed site and additional information may also be needed.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

NATURAL RESOURCES MANAGEMENT

Description

Management of the soil, plant, and wildlife resources of an installation is a monumentally complex task. The demands of the military mission require accommodations totally unlike those typically experienced by the nonmilitary resource manager. The CERL has the capability to provide a wide variety of scientific and technical assistance to aid in management tasks unique to the Army either at one location or those which are common to a particular use or region.

Work Normally Performed By CERL

The CERL can provide a scientist or technical authority to assist the land manager in evaluating the potential seriousness of factors which are affecting the biophysical or socioeconomic environment which is being managed. The advice prepared may identify causes, recommend known solutions, suggest Army-wide research needs, and/or result in a management strategy applicable to the installation(s) and problem(s). Examples of some areas of resource management in which CERL has experience and expertise include:

a. Evaluation of forest resources as a source of energy.

b. Organizaion and conduct of basic information surveys for vegetation, fish, terrestial wildlife and threatened species.

c. Examination of outbreaks of undesirable species.

d. Organization and conduct of environmental assessments for projects/activities which may affect the undeveloped areas of the installation.

e. Management of off-road recreational vehicles.

f. Strategies to minimize damage to installation resources in the course of military use of the lands of the installation.

Support Planning Information

A. Existing background information and project/action specifics should be available.

B. Access to the site(s) in question.

C. Funds for travel and for work efforts beyond the scope of the CERL small problems program.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL WATER MANAGEMENT

Description

The Clean Water Act of 1977 (Public Law 95-217) states that planning for new Department of Army wastewater treatment must consider alternative/innovative technologies such as water conservative processes/practices, reuse/recycle, etc. The Army presently lacks a systematic methodology for this type of assessment. As part of their environmental program, the Army is encouraging the conservation of water supplies and the reuse of valuable resources at Army fixed fcilities.

Wastewater reuse can have several benefits for Army posts: fresh water supplies can be conserved by substituting reclaimed water for sub-potable uses; problems with pollution control can be alleviated by internal recycling and reuse at specific activities; treatment performance can be enhanced by reusing water and reducing the hydraulic load on the treatment plant; nutrients in the wastewater can be utilized as fertilizer in the irrigation waters; zero discharge reuse schemes can eliminate the problems in meeting stringent discharge regulations; and by reducing wastewaters through reuse, posts can save money on water purchase and sewer discharge fees.

Another benefit of reuse is that it highlights the needs for source reduction of wastes and for proper handling and disposal of industrial residues in wastewaters. Elimination of strong wastes from the general waste stream enhances reuse potential and eases pollution abatement problems.

Water resources conservation is a major effort at CERL. CERL is in the process of field testing a model to assess the feasibility and cost of subpotable water reuse in Army fixed regulations.

CERL was also directly responsible for that part of the TRADOC Base Development Study which dealt with centralized water production distribution and disposal. At that time, a manual methodology was developed for determining requirements based on personnel population, function of the base, and the missions of the various organizations stationed at the post.

A current project at CERL deals with water conservation techniques in military construction. This project directly deals with the water conservation problems, such as: identification of high consuming activities and facilities; availability of processes and devices for reduction, and

listing of the first cost, O&M problems associated with application. Among CERL's capabilities are expertise in the areas of: 1) identification of water consuming activities in facilities; 2) sizing of water production and distribution systems based on consumers; 3) availability and responsiveness of water conserving process, devices and appliances; 4) application of current irrigation technology and water practices; 5) landscaping for water conservation; 6) design criteria for wastewater treatment recycle and disposal systems; and 7) operation and maintenance requirements for water production, distribution, and disposal systems.

Support Planning Information

A. Access to water reuse records and sewage treatment plant records.

B. Access to work areas.

C. Interviews with appropriate post personnel.

D. Post maps.

Point of Contact

Commander/Director
US Army Corp of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL WASTE WATER MANAGEMENT

Description

CERL can provide assistance in problem definition, planning programming, design review, design and O&M of waste water pollution control systems associated with industrial, sanitary, and operational activities.

Work Normally Performed By CERL

The CERL water pollution laboratory has facilities for a full spectrum of studies from initial field sampling through chemical analysis and experimental treatability research. Samples may be collected either at fixed time intervals or in proportion to flow rates. Samples of any size may be preserved or returned to CERL, where analyses for any potential contaminant can be performed by skilled chemists often with the aid of automated equipment. CERL also possesses mobile laboratory capabilities.

Engineers in CERL's Environmental Division have experimented in and can provide services for:

1. Industrial and sanitary wastewater treatment
    a. Design and design review
    b. Retrofit/upgrade to include organic, nutrient, and suspended solids
    c. Technology selection
    d. 1391 preparation/cost estimation
    e. O&M manual preparation/supplementation
    f. Problem magnitude assessment
    g. Conducting survey to characterize waste stream
    h. NPDES draft permit review
    i. Analysis of alternate control strategies
    j. Sludge management
    k. Process analysis

l. Pilot testing

m. Rotating biological contactor technology

n. Chemical analysis

o. Design criteria formulation

p. Residue disposal criteria

q. Reuse/recycle

2. Operational Waste Treatment

a. Vehicle washing

b. Maintenance facility waste

c. Hydrocarbon quantification

Support Planning Information

A. Access to water and wastewater records

B. Access to work area

C. Interviews with appropriate post personnel

D. Post maps

E. Housing and tenancy information

F. Tenant special function activity description

G. POCs in each major/minor activity and tenant agency

H. Any permits, compliance orders, etc., between installation and regulatory agency

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL RESOURCE ALLOCATION

Description

The facilities engineer is constantly faced with the need to allocate limited resources to required activities. Several operation research techniques, for instance, linear programming, dynamic programming, activity network scheduling, statistical modeling, and simulation analysis, can be useful in determining how to allocate resources.

Work Normally Performed By CERL

CERL will provide an operations research analyst to assist the facilities engineer in developing the appropriate resource allocation model for the specific problem.

Support Planning Information

Access to computer systems via remote terminal and telephone may be required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 4005

CERL MANAGEMENT CONSULTING

Description

The facilities engineer is often confronted with management problems whose solutions require the application of sophisticated scientific management techniques. CERL can provide that expertise.

Work Normally Performed By CERL

CERL will provide an operations research analyst to assist the facilities engineer with the analysis of a wide range of management problems whose solutions require the use of systems analysis and mathematical modeling. Typical problem areas include but are not limited to economic analysis, decision analysis, risk analysis, forecasting, and procedures analysis and development.

Support Planning Information

Access to computer systems via remote terminal and telephone may be required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

ON SITE OPERATIONS SUPPORT MANAGEMENT

Description

Field operations like, emergency relief operations, require support systems to be successful. CERL can conduct on site operations research to identify and develop the necessary support systems.

Work Normally Performed By CERL

CERL will provide an operations research analyst to perform an on site operations analysis that will identify the support systems required. CERL will also assist the facilities engineer in developing and implementing the support systems. An information management system to help the field operations personnel manage the specific operation and an upward reporting system to provide status reports to higher echelons are typical of generally required support systems for field operations.

Support Planning Information

Access to computer systems via remote terminal and telephone may be required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

ESC

ENGINEER SUPPORT TO MILITARY OPERATIONS

Description

ESC is charged with conducting studies and analyses when engineer or engineer-related factors are primary problem components. As a field operating activity of the US Army Corps of Engineers, ESC has been involved traditionally with problems evolving from the Chief of Engineers' civil and military responsibilities and from his role as engineer advisor to the Chief of Staff, US Army. ESC analyses of engineer support to military operations have been a mainstay of ESC's workload over the last 25 years. ESC has the capability to analyze engineer issues in the forward and rear combat zones and issues related to the Corps' role in CONUS mobilization. The capability includes such topics as combat support, engineer force structure, base development, war damage repair, construction policies, employment concepts for engineer resources, and host-nation support.

Work Normally Performed By ESC

In keeping with ESC's organization and current study procedures, engineer support analyses have been conducted by interdisciplinary study teams whose personnel have an especially heavy emphasis on military knowledge and experience. These analytical teams vary in size from two to seven individuals and often incorporate OR/SA techniques and computer support. The descriptions listed below are indicative of ESG's experience as an advisor on engineering support to military operations.

- Critique existing engineer plans, develop tasks in support of plans, and analyze current and future capabilities.

- Define and quantify customer demands on engineer resources, and provide data bases for converting task demands into resource requirements.

- Recommend system improvements (e.g., force structure, equipment, deployment schedules).

- Determine the impact of various scenarios on the

engineer system (requirements and capabilities).

- Recommend wartime organization.
- Recommend allocation and reallocation of resources.

Support Planning Information

Although the support needed to conduct the work varies greatly with the nature of the project, the one constant requirement is for a readily accessible point of contact who can provide data and guidance as required through the duration of the project. Concerning initiation of a project, it is usually to the advantage of the potential sponsor to call ESC to discuss work requirements before formalizing a support request.

Reimbursement of support costs is normally not required. Limited TDY and travel costs are covered by ESC subject to availability of funds. Reimbursement for any extensive computer usage or other extraordinary study costs may be required.

Point of Contact

Commander/Director
US Army Engineer Studies Center
6500 Brook Lane
Washington, DC 20315

ESC. PROGRAM EVALUATION

Description

ESC's experience in program evaluation is prompted by its mission to "perform studies and analysis for the Corps of Engineers and other US Army activities and agencies where engineer or engineer-related technical factors and considerations are involved". Typically, these evaluations have been of the non-recurring type and have required the immersion of a small study team in the operations of an Army FOA, MACOM, or other DA program.

Work Normally Performed By ESC

An ESC program evaluation team is composed of two to four analysts with interdisciplinary backgrounds who focus primarily on program procedures, interfaces, and results. They generally have some previous knowledge of military organizations and operations and often incorporate OR/SA techniques. One especially large program on which ESC assessments have had recurring impact has been the continuing program for study of the Army's real property management and real property maintenance systems. The program evaluation categories listed below are not intended to suggest limitations in ESC capability, but to indicate the general areas in which ESC has substantial experience:

- Determining feasibility of consolidating activities.
- Assessing ability to supply product.
- Assessing distribution system vulnerability.
- Assessing product availability.
- Ascertaining appropriate level for functions; recommending organizational alternatives.
- Analyzing major components of a program and pinpointing critical elements.
- Examining highly decentralized organization and

recommending tailoring mechanism.

- Examining current program configuration and determining capabilities under future sudden growth situations.

Support Planning Information

Although the support needed to conduct the work varies greatly with the nature of the project, the one constant requirement is for a readily accessible point of contact who can provide data and guidance as required through the duration of the project. Concerning initiation of a project, it is usually to the advantage of the potential sponsor to call ESC to discuss work requirements before formalizing a support request.

Reimbursement of support costs is normally not required. Limited TDY and travel costs are covered by ESC subject to availability of funds. Reimbursement for any extensive computer usage or other exraordinary study costs may be required.

Point of Contact

Commander/Director
US Army Engineer Studies Center
6500 Brook Lane
Washington, DC 20315

CRREL

INSULATION AND VAPOR BARRIERS

Description

The mandated upgrading of insulating ability of existing government facilities is a monumental job. Reinsulating buildings can be time consuming and a hit-or-miss proposition as our studies with urea formaldehyde (UF) foam insulation have shown.

In order for any insulation to be effective it must be kept dry because water reduces the thermal value of essentially all insulating materials. Laboratory studies have been conducted at CRREL to define the thermal consequences of various amounts of moisture on a variety of insulations.

Vapor barriers can be an effective retarder of air and moisture movements through building components. In order to determine the relative merits of various vapor control measures, CRREL engineers have examined numerous buildings in cold regions and a large-panel test apparatus has been built to evaluate various materials and systems.

Work Normally Performed By CRREL

CRREL can provide advice and assistance on insulation and moisture related problems. On-site measurements of the thermal resistance of buildings can be supplemented with controlled laboratory studies of large components.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

IWR WATER RESOURCES PLANNING

Description

Determine data collection and methodological needs to solve water resources planning problems.

Work Normally Performed By IWR

IWR will provide a water resources planner, engineer, sociologist, economist, or environmental planner to assist Engineer Districts to develop scopes of work for contract or in-house studies, and assist in contractor selection and contract monitoring. Such assistance incorporates appropriate results of IWR R&D work, IWR staff specialized technical training and experience in Division and/or District offices. The general categories of IWR capability are:

- Navigation Analysis
- Regional and Social Impact Assessment
- Flood Control, Recreation, Water Quality, Benefits
- Public Involvement
- Permit Assessment
- Environmental Planning
- Water Conservation Planning
- Hydropower Planning
- Policy Analysis

Support Planning Information

IWR will supply a consultant for one to two days without cost to assist in problem identification and scoping.

Point of Contact

Commander/Director
US Army Corps of Engineers
Institute for Water Resources
Kingman Building
Ft. Belvoir, VA 22060

IWR

SPECIAL STUDIES IN WATER RESOURCES PLANNING

Description

IWR undertakes the management of special studies combining the economic, environmental, engineering and social components of water resources planning. IWR develops the methodologies, techniques and guidance incorporated into the special studies.

Work Normally Performed By IWR

Examples of current special studies managed by IWR are:

a. National Hydropower Study

b. National Waterways Study

IWR study management terms developed the scope of work, allocated work among contractors and/or Corps Division and District offices and are responsible for final reports conclusions and recommendations. IWR is located in Fort Belvoir, Virginia with ready access to Corps of Engineers information sources and to specialists in Federal agencies and national trade organizations in the Washington, DC metropolitan area.

Other reimbursable special studies undertaken by IWR are in the following subject areas in water resources planning management:

a. Urban water systems

b. Water resources data center

c. Water conservation

d. Corps permit activities

e. Public involvement

f. Environmental studies

Support Planning Information

A. Copy of statement regarding special studies such as authority, scope, schedule, funding and require output.

B. IWR will provide reasonable staff time to assess possibility of IWR assistance in conduct of special study.

C. Work undertaken on a reimbursable basis.

Point of Contact

Commander/Director
US Army Corps of Engineers
Institute for Water Resources
Kingman Building
Ft. Belvoir, VA 22060

IWR

TRANSPORTATION PLANNING AND ANALYSIS

Description

Planning of transportation facilities and services by Facilities Engineers needs to consider the demand for them and the ability of the various modes of transportation (inland waterway, ship, rail, truck, bus, automobile, and air) to supply the service. It is necessary to know the physical and operational characteristics of the various modal facilities and equipment, their costs and rates, their historical and future traffic patterns, and the factors affecting commodity and passenger traffic. In addition, transportation planning studies must be able to access and properly employ the appropriate data, procedures, and analytical techniques.

Work Normally Performed By IWR

The Navigation Analysis Center (NAC) of IWR will provide appropriate personnel to assist the facilities engineer in obtaining answers to transportation research questions, conducting transportation planning studies, and solving transportation operations problems, particularly as they relate to the water and rail modes. The types of services available include:

a. Review, analysis, and consultation of research needs, planning and operational studies, policy studies, and special problems.

b. Obtaining, providing, and advising on proper use of published and computer stored data.

c. Review, analysis, and consultation on study methods, procedure, and analytical techniques including statistics, models, systems analysis, and computer applications.

d. Knowledge of and advise on physical and operating characteristics of modal facilities and equipment, costs and rates, traffic demand and supply pattern, and impacts.

Support Planning Information

Copy of research, study, or project description or plan should be available. Telephone first to define problem or need and the NAC's ability to provide assistance.

Point of Contact

Commander/Director
US Army Corps of Engineers
Institute for Water Resources
Kingman Building
Ft. Belvoir, VA 22060

IWR

WATER RESOURCE POLICY STUDIES

Description

Analysis of policy oriented issues associated with the Corps of Engineers Water Resource Development Program.

Work Normally Performed By IWR

The IWR Policy Studies Program is developed in coordination with and exists primarily in support of the OCE Office of Policy (DAEN-CWR). The program involves the following general subject areas:

a. Water resource policy analysis focusing on planning methodologies and encompassing economic, social and environmental interests and concerns.

b. New mission exploration and development.

c. Program evaluation.

d. Development of methods and procedures for the technical evaluation of water resources projects, including economic, social and environmental parameters.

e. Major high priority interagency policy studies and analysis of critical emerging national issues.

Support Planning Information

A. Detailed problem descriptions.

B. Preliminary clearance from DAEN-CWZ-B or higher authority.

Point of Contact

Commander/Director
US Army Corps of Engineers
Institute for Water Resources
Kingman Building
Ft. Belvoir, VA 22060

FESA

ENERGY CONSERVATION AND ANALYSIS CENTER

Description

In addition to an extensive technical library, FESA has computer access to the world's largest and most comphrehensive bibliographic data base on energy conservation. This data base is maintained current by the US Department of Energy and contains abstracts on an extensive collection of publications related to energy conserving devices and techniques. FESA has also contracted with a commercial firm that performs tests and evaluations, as requested.

Work Normally Performed By FESA

FESA will conduct literature surveys or make recommendations in response to any question regarding the viability of specific energy conserving devices or techniques. The time required to answer a question depends on the nature of the question. Some can be answered in less than a day while others may require several months and contract support. In most cases, contract costs are non-reimbursable.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Fort Belvoir, VA 22060

FESA

PRODUCT TESTING AND EVALUATION

Description

FESA monitors new technology and product offerings in the category of facility equipment. Literature and inquiries are compiled on those devices which appear to be applicable to Army facilities and which offer improved efficiency, reliability, economy or energy savings.

Work Normally Performed By FESA

FESA will provide support to the requester in the form of engineering studies, vendor coordination, product investigation, limited testing, evaluation of installed equipment, and product specification.

Support Planning Information

Requester forwards information on the product of interest and particulars of the application where the product will be used. Problem areas may be submitted requesting recommendations for suitable equipment. System information furnished to FESA should include such items as: manufacturer, model no., serial no., voltage, pressure, operating conditions, usage, duty cycle, etc.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Fort Belvoir, VA 22060

UTILITY SERVICES

FESA HVAC SYSTEMS ASSISTANCE

Description

Many of the heating, ventilation, and air conditioning (HVAC) systems installed in Army buildings have not been designed to operate efficiently from an energy usage standpoint. By modifying the system control strategies and/or the HVAC system itself, substantial savings in building operating costs may be realized without sacrificing comfort levels for the occupants.

Work Normally Performed By FESA

Engineers and/or technicians will survey buildings and inspect HVAC systems specified by the requester. The results of these inspections will be analyzed by FESA Engineering Division and a report prepared which will recommend control strategy and/or equipment modifications to reduce building energy consumption. In addition, approximate system modification costs and annual energy savings shall be estimated and a pay-back analysis performed. For large projects, this analysis can be used as the justification for the request for energy conservation investment program (ECIP) funds.

Support Planning Information

A. Customer should make available complete sets of engineering drawings of HVAC systems in buildings to be studied. Also, fuel consumption data (if available) should be available as well as energy cost data.

B. Normally, the assistance of one technician familiar with the HVAC systems under study is required to assist the FESA survey team.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

WES

DISPOSAL OF TOXIC HAZARDOUS WASTES

Description

Toxic or hazardous wastes of a non-ordinance type (discarded pesticides, gasoline tank sludges, etc.) require unusual handling and pretreatments not routinely required with other waste materials. WES can provide a team of engineers and technicians to survey toxic and hazardous waste disposal problems and recommend action to be taken to safely handle and dispose of these materials.

Work Normally Performed By WES

WES can provide qualified engineers and technicians to survey the problem and establish new handling and disposal procedures as required. The team will perform a detailed facility inspection, obtain analyses of waste materials and conduct discussions with operating and maintenance personnel. Testing of pre-treatment (chemical stabilization) procedures can also be undertaken as required. The disposal requirements will be documented for action by responsible authorities.

Support Planning Information

A. Any records pertaining to the hazardous waste should be available for inspection.

B. If the waste is generated by facilities on site, the personnel familiar with the operation of the particular facilities should be available for discussion.

Point of Contact

Commander/Director
US Army Corps of Engineers
Waterways Experiment Station
P. O. Box 631
Vicksburg, MS 39180

CRREL

WATER SUPPLY AND TREATMENT

Description

Water supply and treatment includes all the steps, processes, and operations necessary to deliver water from a raw water source to consumers in a safe and aesthetically pleasing manner. Evaluation of raw water sources and consumer demands leads to decisions regarding adequacy of quantity and quality changes necessary in a treatment works. This information in turn leads to design of alternative treatment drains and distribution systems. CRREL has the capability to evaluate all elements of a water supply and treatment system with special emphasis on problems caused by cold weather conditions.

Work Normally Performed By CRREL

CRREL can provide assistance in evaluating potential water supply sources; evaluation and conceptual design of treatment works; and review and evaluation of distribution systems for potential cold weather related problems. CRREL also has the capability for field and laboratory water analysis.

Support Planning Information

A. Any existing facility plans

B. Water quality data

C. USGS stream flow data and/or test well results

D. Regulatory agency requirements

E. USGS topo maps for distribution systems

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

SEWAGE TREATMENT AND DISPOSAL

Description

Sewage treatment is the process of removing or reducing the pollutant concentration of wastewater prior to applying it to the land or discharging it into a water body. Various chemical, physical, and biological processes are used. The primary purposes of sewage treatment are to protect the public health and the environment.

Work Normally Performed By CRREL

CRREL will assist the facilities engineer in solving the operating and maintenance problems of both the conventional and land treatment sewage treatment facilities, particularly those types of problems associated with cold regions. An example would be the effects of low temperature wastewater on chemical and biological reaction rates. CRREL also will review plans and specifications for either proposed changes to existing facilities or for new facilities. CRREL also has the capability to analyze wastewater for the following: BOD_5, COD, TOC, NH_3, NO_3, TKN, PO_4, Solids, Metals, Trace Organics.

Support Planning Information

A. Discharge limitations if any

B. Past performance data

C. Wastewater characteristics

D. Copies of plans and specifications of proposed changes.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

LAND TREATMENT OF WASTEWATER

Description

Land treatment of wastewater involves the use of plants and soil to remove pollutants. In addition to achieving excellent removals, land treatment systems recycle valuable nutrients back into the land. Field and forage crop such as corn and alfalfa are often grown. The operation and maintenance costs of these systems are usually much lower than conventional systems.

Work Normally Performed By CRREL

CRREL can provide assistance in evaluating potential land treatment sites, reviewing facility plans and the operation and maintenance of the facility. Also, CRREL has the capability to conduct water, soil and plant analyses.

Support Planning Information

A. USGS Topographical maps.

B. Soil surveys.

C. Boring logs, if available.

D. Climatic information.

E. Wastewater characteristics.

F. Discharge limits, if any.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

EMERGENCY SERVICES

FESA

PROVIDE EMERGENCY OR STAND-BY POWER

Description

FESA is the operating element for the US Army Non-Tactical Generator (NTG) Program. This program includes acquisition and maintenance of a significant quantity of large, medium voltage diesel, and gas turbine-powered generators, and transmission/distribution equipment to meet contingency or high-priority, emergency, non-contingency requirements.

Work Normally Performed By FESA

FESA will assist in the analysis of power generation requirements and will compare those requirements with the capabilities of the NTG Program. If appropriate, NTG Program equipment will be supplied to meet the power generation requirement. FESA can assist in the development of the plant site, installation, operations, and maintenance of the NTG equipment. In addition, FESA can develop and implement a course of instruction to train personnel to operate and maintain the equipment. FESA's resources normally do not allow operation and maintenance of deployed equipment on a continuous basis by FESA.

Support Planning Information

The NTG Program power generation equipment is rated as three-phase, 2400/4160 volt, 60 hertz. A limited amount of the equipment also can be converted for 50 hertz operation. The NTG Program equipment inventory contains 500 KW diesel generators; 700/750 KW diesel generators; 750 KW gas turbine generators; and 1500 KW, 2000 KW, and 4500 KW power plants in storage at Tooele Army Depot, Utah. All of the equipment is contained in operating shelters, except the 1500 KW and 2000 KW plants, which require a suitable shelter. The equipment weights range from a generator weight of 27,000 pounds to 116,400 pounds. The user is responsible for all costs incurred by use of NTG Program equipment to include, but not limited to, charges for transportation, operation, maintenance, and depot overhaul upon completion of use.

Point of Contact

Commander/Director
US Army Corps of Engineers
Facilities Engineering Support Agency
Ft. Belvoir, VA 22060

CRREL SNOW ROADS AND RUNWAYS

Description

Frequently in the cold regions standard road and runway construction materials are either not available, cannot be utilized, or, in the case of short term seasonal use, are not economically justified. Snow or snow-ice mixtures can be used to prepare suitable pavements. For optimum results, certain construction techniques and scheduling of specific sequential operations are required, depending on environmental, terrain and snow cover conditions, and the expected type of traffic.

Work Normally Performed By CRREL

CRREL can provide consultation to assess the requirements (equipment, construction procedures) as dictated by the local conditions and required pavement bearing capacity and furnish either reports and manuals or an engineer to assist the facilities engineer in developing design criteria, operational procedures and conducting evaluation tests. The general categories covering CRREL's capabilities include:

1. Snow road and runway design criteria.
2. Knowledge of snow processing, compaction, leveling, and maintenance equipment capabilites.
3. Construction procedures and techniques.
4. Effect of terrain and climatic characteristics on snow and ice properties.
5. Required snow and ice properties for support of various traffic loads and frequencies.
6. Test procedures for evaluating snow and ice pavement bearing capacity.
7. Behavior of snow and ice under load as related to their mechanical properties (snow mechanics).

8. Traction characteristics of snow and ice pavement surfaces.

Support Planning Information

A. Data on expected climatic conditions during construction and subsequent use.

B. Terrain characteristics.

C. Expected traffic characteristics (gross load, wheel or track load, frequency of traffic).

D. Availability of snow, ice, and water.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

CRREL

SNOW AND ICE ON ROADS AND AIRFIELDS

Description

Emergency snow removal and control of ice accumulation on roads, airfield runways and helipads requires pre-storm preparation of plows and equipment, storm equipment mobilization and deployment, and post-storm clean-up and preparations for the next winter storm. CRREL can assist in selection of optimum equipment for climate conditions and installation parameters and in preparation of a storm emergency plan.

Work Normally Performed By CRREL

CRREL can provide an engineer to make a site inspection and prepare recommendations for optimum selection and use of snow clearance, snow hauling, and chemical ice control equipment. Advice can be provided and guidelines prepared for selection of appropriate ice control chemicals and their application rates to minimize chemical use but achieve a trafficable surface within a specified response time.

Support Planning Information

A. Copy of existing snow emergency plan.

B. List of motorized equipment which may be used for snow clearance, snow hauling, or spreading chemicals.

C. Map of insallation with indication of priority roads, areas where corrosive chemicals cannot be used (all aircraft areas), parking lots, and snow dump areas.

D. If available, the storm history of the preceding three or four winters; dates of snow or ice storms, duration, total accumulation, air temperature, wind speed and direction.

Point of Contact

Commander/Director
US Army Corps of Engineers
Cold Regions Research and Engineering Laboratory
P. O. Box 282
Hanover, NH 03755

ADMINSTRATIVE SERVICES

WRSC-D

REVOLVING FUND AND PLANT REPLACEMENT AND IMPROVEMENT PROGRAM

Description

WRSC-D is responsible for the management of the US Army Corps of Engineers Revolving Fund and the Plant Replacement and Improvement Program (PRIP). In this respect it deals with the designated personnel at the Division level.

Work Normally Performed By WRSC - D

WRSC-D provides an engineer-manager to the field upon request on questions regarding the Revolving Fund and PRIP. Meetings are held on a regular basis in the field with pertinent managers at the Divisions which include District personnel.

Support Planning Information

A. Project information

B. Budget submittals and justifications

Point of Contact

Commander/Director
US Army Corps of Engineers
Water Resources Support Center
ATTN: WRSC-D
Kingman Building
Ft. Belvoir, VA 22060

INSTALLATION PROJECT
FINANCIAL MANAGEMENT

ESC MANAGEMENT ANALYSIS

Description

As a field operating activity of the US Army Corps of Engineers, ESC conducts non-recurring examinations of management systems and issues in which engineer or engineer-related factors are primary components. The problems now defined as "management" cannot be neatly consigned to the realm of personnel policies or communication skills. They cut across the lines of human resources and process and material interfaces. Thus, ESC has become involved with management analyses through the indirect route of assessing any topic with engineer implications. All engineering projects must be managed in some fashion; ESC has taken its approach to management problems to Corps-wide problems, specific installation problems, other agency problems, and specific Corps and Army element problems.

Work Normally Performed By ESC

As with the program evaluation capability, the ESC management analysis teams are small and interdisciplinary. Typically, teams of from two to five analysts spend anywhere from 2 weeks to 2 years cutting through existing roadblocks of precedence, guidance, resource limitations, and inefficiency. The product is usually a written analysis of the existing situation and a list of recommended remedial actions supported by an implementation plan. At times, however, the product has been a briefing to the commander involved or some facilitating interaction with a team of managers supplied by the requesting installation or command. The descriptions listed below are indicative of ESC's experience in management areas:

- Examine management functions, policies, strategies, and interfaces; devise alternatives to improve system effectiveness.

- Examine training, management development, resource management practices, and alignment of training staff; present conclusions and recommendations for improvement.

Support Planning Information

Although the support needed to conduct the work varies greatly with the nature of the project, the one constant requirement is for a readily accessible point of contact who can provide data and guidance as required through the duration of the project. Concerning initiation of a project, it is usually to the advantage of the potential sponsor to call ESC to discuss work requirements before formalizing a support request.

Reimbursement of support costs is normally not required. Limited TDY and travel costs are covered by ESC subject to availability of funds. Reimbursement for any extensive computer usage or other exraordinary study costs may be required.

Point of Contact

Commander/Director
US Army Engineer Studies Center
6500 Brook Lane
Washington, DC 20315

CERL

RESEARCH IN SYSTEMS BUILDING ECONOMICS

Description

An automated preliminary analysis of the economic potential for Industrialized Building Systems. Based on project size and the availability of systems as one of several parameters of overall feasibility, this analysis indicates favorable, or unfavorable, economic conditions for the use of Industrialized Building Systems.

Work Normally Performed By CERL

CERL will instruct the user (usually at the District level) in the operation of the Simulating the Bid Response program, and provide criteria for further examination of the feasibility of utilizing Industrialized Building Systems.

Support Planning Information

The user will require the following information for the automated analysis:

a. The installation's location, by state

b. The building type

c. The facility's size, in square feet

d. The programmed amount for the facility

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

CERL

SUPPORT MANAGEMENT ENGINEERING - O & M FACILITIES

Description

Research in the development and design of management procedures, organizational problems and automated systems to improve the capabilities of the Facilities Engineer housing manager to provide operation and maintenance and housing services.

Work Normally Performed By CERL

CERL provides analysts or engineers to study problems, perform research and provide a report or system on the solutions, techniques or procedures. CERL is currently researching interactivity for IFS, housing management procedures and systems, contract specifications for housing maintenance.

Support Planning Information

1. Statement of the problem.
2. Request CERL for a proposal.
3. Projects are reimbursable if more than 2 days or travel is required.

Point of Contact

Commander/Director
US Army Corps of Engineers
Construction Engineering Research Laboratory
P. O. Box 4005
Champaign, IL 61820

DIRECTORY

CORPS OF ENGINEERS
AGENCIES

HEADQUARTERS

Chief of Engineers

Mail Address:

Department of the Army
Washington, D.C. 20314

Office Location:

20 Massachusetts Ave., NW
Washington, D.C.

ONE - STOP SUPPORT DISTRICTS

US Army Engr Div, Europe
Mail Address:
APO New York 09757
Office Location:
Luebeckerstr. Bldg. #31
Frankfurt, Germany

US Army Engr Div, Pacific Ocean
Mail Address:
Bldg. 230
Ft. Shafter, HI 96858

US Army Engr Dist, Alaska
Mail Address:
P.O. Box 7002
Anchorage, AK 99510
Office Location:
Bldg. 21-700
Elmendorf Air Force Base, AK

US Army Engr Dist, Seattle
Mail Address:
P.O. Box C-3755
Seattle, WA 98124
Office Location:
4735 East Marginal Way South
Seattle, WA

US Army Engr Dist, Los Angeles
Mail Address:
P.O. Box 2711
Los Angeles, CA 90053
Office Location:
300 North Los Angeles St.
Los Angeles, CA

US Army Engr Dist, Sacramento
650 Capital Mall
Sacramento, CA 95814

US Army Engr Dist, Kansas City
Mail Address:
700 Federal Building
Kansas City, MO 64106
Office Location:
601 E. 12th St.
Kansas City, MO

US Army Engr Dist, Omaha
Mail Address:
6014 USPO & Courthouse
215 North 17th St.
Omaha, NE 68102

US Army Engr Dist, Fort Worth
Mail Address:
P.O. Box 17300
Ft. Worth, TX 76102
Office Location:
819 Taylor Street
Ft. Worth, TX

US Army Engr Dist, Louisville
Mail Address:
P.O. Box 59
Louisville, KY 40201
Office Location:
600 Federal Place
Louisville, KY

US Army Engr Dist, Nashville
Mail Address:
P.O. Box 1070
Nashville, TN 37202

US Army Engr Dist, Mobile
Mail Address:
P.O. Box 2288
Mobile, AL 36628
Office Location:
109 St. Joseph Street
Mobile, AL

US Army Engr Dist, Baltimore
Mail Address:
P.O. Box 1715
Baltimore, MD 21203
Office Location:
31 Hopkins Plaza
Baltimore, MD

US Army Engr Dist, New York
26 Federal Plaza
New York, NY 10007

US Army Engr Dist, Norfolk
803 Front Street
Norfolk, VA 23510

US Army Engr Dist, Savannah
Mail Address:
P.O. Box 889
Savannah, GA 31402
Office Location:
200 E. Saint Julian Street
Savannah, GA

FIELD OPERATING AGENCIES

US Army Engineer Topographic Laboritories
Fort Belvoir, VA 22060

US Army Facilities Engineering Support Agency
Bldg. 358
Fort Belvoir, VA 22060

US Army Engineer Waterways Experiment Station
Mail Address:
P.O. Box 631
Vicksburg, MS 39180
Office Location:
Halls Ferry Road
Vicksburg, MS

US Army Coastal Engineering Research Center
Kingman Building
Fort Belvoir, VA 22060

US Army Cold Regions Research and Engineering Laboratory
Mail Address:
P.O. Box 282
Hanover, NH 03755
Office Location:
Lyme Road
Hanover, NH

US Army Construction Engineering Research Laboratory
Mail Address:
P.O. Box 4005
Champaign, IL 61820
Office Location:
Interstate Research Park
2902 Newmark Drive
Champaign, IL

LISTING OF TECHNICAL CONSULTANTS

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
1. ENGINEERING SERVICES				
(a) Guidance and Criteria for Designing Seismic Shock-Resistant Structures	James T. Ballard	USA WES	ATTN: WESSS P. O. Box 631 Vicksburg, MS 39180	FTS 542-2291 601-634-2291
(b) Explosion Effects Advice	Leo F. Ingram	USA WES	ATTN: WESSE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2705 601-634-2705
(c) Dust Control	Sidney Tucker	USA WES	ATTN: WESGS P. O. Box 631 Vicksburg, MS 39180	FTS 542-3389 601-634-3389
(d) Consultant and Geotechnical Support Services in Soil Mechanics and Foundation Engineering	Leroy McAnear	USA WES	ATTN: WESGE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2228 601-634-2228
(e) Design and Operational Planning for Non-Typical Waste Treatment Systems	A. J. Green	USA WES	ATTN: WESEE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2408 601-634-2408
(f) Methodology for Area-Wide Planning Systems (MAPS)	A. J. Green	USA WES	ATTN: WESEE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2408 601-634-2408

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
1. ENGINEERING SERVICES				
(g) Ecosystem Modeling (Physical and Mathematical)	D. L. Robey	USA WES	ATTN: WESES P. O. Box 631 Vicksburg, MS 39180	FTS 542-2263 601-634-2263
	J. L. Grace	USA WES	ATTN: WESES P. O. Box 631 Vicksburg, MS 39180	FTS 542-3346 601-634-3346
(h) Computer Aided Procedures for Design and Evaluation of Wastewater Treatment Systems (CAPDET)	A. J. Green	USA WES	ATTN: WESEE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2408 601-634-2408
(i) Design and Maintenance of Roads and Airfields	N. Smith, R. Eaton, Dr. R. Berg	USACRREL/EG	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(j) Air Pollution Control Systems	Walter Mikucki	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7250 217-352-6511 Ext. 250
(k) Solid/Hazardous Waste Management	Bernard A. Donahue	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7381 217-352-6511 Ext. 381
(l) Noise Impact Prediction	Paul D. Schomer	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7210 217-352-6511 Ext. 210

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
1. ENGINEERING SERVICES				
(m) Architectural Acoustics	Paul D. Schomer	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7210 217-352-6511 Ext. 210
(n) Noise Impact Mitigation	Paul D. Schomer	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7210 217-352-6511 Ext. 210
(o) Design, Construction, and O & M Deficiency Reporting and Analysis	Ray Larson	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7221 217-352-6511 Ext. 221
(p) Support Management Engineering	Ray Larson	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7221 217-352-6511 Ext. 221
(q) Energy Conservation Methods	Robert Blackmon	CERL-EH	P. O. Box 4005 Champaign, IL 61820	FTS 958-7308 217-352-6511 Ext. 308
(r) Habitability Interior Design Guidance	Dr. Robert Porter	CERL-EH	P. O. Box 4005 Champaign, IL 61820	FTS 958-7404 217-352-6511 Ext. 404

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
1. ENGINEERING SERVICES				
(s) Corrosion Mitigation Techniques	Dr. Askok Kuman	CERL-EM	P. O. Box 4005 Champaign, IL 61820	FTS 958-7208 217-352-6511 Ext. 208
(t) Use of Alternative Energy Sources	Dr. Donald Leverenz	CERL-EH	P. O. Box 4005 Champaign, IL 61820	FTS 958-7375 217-352-6511 Ext. 375
(u) Energy Management Techniques	Robert Blackmon	CERL-EH	P. O. Box 4005 Champaign, IL 61820	FTS 958-7308 217-352-6511 Ext. 308
(v) Preparation of Manuals and Guide Specifications	Al Beitelman	CERL-EM	P. O. Box 4005 Champaign, IL 61820	FTS 958-7421 217-352-6511 Ext. 421
(w) Ice Engineering	Guenther Frankenstein	USACRREL	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(x) Facility Planning in Cold Regions	Steve Flanders or Wayne Tobiasson	USACRREL	Hanover, NH 03755	AV 684-3400 FTS 834 7585 603-643-3200

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Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
1. ENGINEERING SERVICES				
(y) Marine Design	Keith Lawrence Neil Samuels (Alternate)	WRSC-MD	U.S. Custom House 2nd & Chestnut Streets Philadelphia, PA 19106	215-597-4860 (Alternate/WRSC-D) 202-325-0537
(z) Hydrological Engineering Research	Arlen D. Feldman	WRSC-HEC	Corps of Engineers 609 Second Street Davis, CA 95616	916-440-3285
(aa) Analytical Planning Research	Darryl W. Davis	WRSC-HEC	Corps of Engineers 609 Second Street Davis, CA 95616	916-440-3480
(bb) Training in Hydrologic Engineering and Planning	William K. Johnson	WRSC-HEC	Corps of Engineers 609 Second Street Davis, CA 95616	916-440-2105

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
2. TECHNICAL SERVICES				
(a) Cement and Pozzolan Testing	William G. Miller	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3261 601-634-3261
(b) Chemical Analysis of Water, Soil, Sediments	lony B. Husbands	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3275 601-634-3275
(c) Plastics Testing	Tony B. Husbands	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3275 601-634-3275
(d) Mineralogical Compostion of Soil	Alan D. Buck	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3271 601-634-3271
(e) Special Investigations of Materials	Alan D. Buck	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3271 601-634-3271
(f) Grouting Applications	John A. Boa	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3217 601-634-3217

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
2. TECHNICAL SERVICES				
(g) Instrumentation of Existing Concrete Structures	Billy R. Sullivan	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3235 601-634-3235
(h) Condition Survey of Concrete in Service	James E. McDonald	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3230 601-634-3230
(i) Nondestructive Testing of Concrete Structures	Henry T. Thornton	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3797 601-634-3797
(j) Petrography of Concrete	Alan D. Buck	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3271 601-634-3271
(k) Computer Computation of Temperatures and Thermal Stress and Strain in Concrete Structures	Anthony A. Bombich	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3238 601-634-3238
(l) Thermal Tests	Billy R. Sullivan	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3235 601-634-3235

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
2. TECHNICAL SERVICES				
(m) Mechanical Impedance Measurements	Alton M. Alexander	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3237 601-634-3237
(n) Engineering Geology and Rock Mechanics	Don C. Banks	USA WES	ATTN: WESGR P. O. Box 631 Vicksburg, MS 39180	FTS 542-2630 601-634-2630
(o) Aquatic Plant Control	J. L. Decell	USA WES	ATTN: WESEV P. O. Box 631 Vicksburg, MS 39180	FTS 542-3494 601-634-3494
(p) Military Hydrology	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 39180	FTS 542-2683 601-634-2683
(q) Environmental Baselines	C. J. Kirby	USA WES	ATTN: WESER P. O. Box 631 Vicksburg, MS 39180	FTS 542-3456 601-634-3456

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2. TECHNICAL SERVICES				
(r) Surface or Groundwater Pollution Investigation	A. J. Green	USA WES	ATTN: WESEE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2408 601-534-2408
(s) Non-Routine Chemical Analytical Services	J. D. Westhoff	USA WES	ATTN: WESEV P. O. Box 631 Vicksburg, MS 39180	FTS 542-2473 601-634-2473
(t) Water Chemistry	M. McLeod	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6463 703-664-6463
(u) Boiler Efficiency Testing	S. Sharma	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6463 703-664-6463
(v) Application of Heat Recovery Techniques	Steve Jones	FESA-T	FESA Fort Belvoir, VA 22060	AV 354-6463 703-664-6463
(w) Environmental Information	Mr. Robert Frost	ETL	USAETL Fort Belvoir, VA 22060	AV 354-3621 703-664-3621

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
2. TECHNICAL SERVICES				
(x) Movement of Large Structures	Mr. Kenneth Robertson	ETL	USAETL Fort Belvoir, VA 22060	AV 354-6194 703-664-6194
(y) Acoustical Sound and Vibration Measurements, Noise Monitoring	Paul D. Schomer	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7210 217-352-6511 Ext. 210
(z) Preparation of Manuals and Guide Specifications	Robert Blackmon	CERL-EH	P. O. Box 4005 Champaign, IL 61820	FTS 958-7308 217-352-6511 Ext. 308
(aa) Quality Assurance Testing of Paints and Coatings	Richard Lampo	CERL-EM	P. O. Box 4005 Champaign, IL 61820	FTS 958-7421 217-352-6511 Ext. 421
(bb) Development of Protective Coatings	Al Beitelman	CERL-EM	P. O. Box 4005 Champaign, IL 61820	FTS 958-7421 217-352-6511 Ext. 421
(cc) Selection and Application of Paints and Coatings	Al Beitelman and Rich Lampo	CERL-EM	P. O. Box 4005 Champaign, IL 61820	FTS 958-7421 217-352-6511 Ext. 421

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2. TECHNICAL SERVICES				
(dd) Coastal Ecology	Neill Parker	CERC	ATTN: CEREN Kingman Building Fort Belvoir, VA 22060	202-325-7116
(ee) Harbors	Neill Parker	CERC	ATTN: CEREN Kingman Building Fort Belvoir, VA 22060	202-325-7116
(ff) Beach Nourishment	Neill Parker	CERC	ATTN: CEREN Kingman Building Fort Belvoir, VA 22060	202-325-7116
(gg) Shore Protection	Neill Parker	CERC	ATTN: CEREN Kingman Building Fort Belvoir, VA 22060	202-325-7116
(hh) Dredging Operations and Technology	William R. Murden Neil Samuels (Alternate)	WRSC-D	Kingman Building Fort Belvoir, VA 22060	202-325-0537
(ii) Communications	Jack Jarman	WRSC-C	ATTN: WRSC-C Kingman Building Fort Belvoir, VA 22060	202-325-0670

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
3. CONSTRUCTION SERVICES				
(a) Concreting Operations and Practices	Kenneth L. Saucier	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3251 601-634-3251
(b) Concrete Materials Evaluation	John M. Scanlon	USA WES	ATTN: WESSC P. O. Box 631 Vicksburg, MS 39180	FTS 542-3277 601-634-3277
(c) Cold Weather Construction	Francis H. Sayles	USACRREL/EG	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(d) Construction Site Selection	Paul V. Sellmann	USACRREL/EG	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(e) Construction Management	Mike O'Connor	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7204 217-352-6511 Ext. 204
(f) Snow Loads on Structures	Robert Redfield, Wayne Tobiasson	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
2. TECHNICAL SERVICES				
(jj) Graphics Systems	Jack Jarman	WRSC-C	ATTN: WRSC-C Kingman Building Fort Belvoir, VA 22060	202-325-0670
(kk) Buildings and Grounds RPMA Support	Paul Tan	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6671 703-664-6671

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4. SPECIAL STUDIES & SURVEYS				
(a) Pavement Investigation	Alfred H. Joseph	USA WES	ATTN: WESGI P. O. Box 631 Vicksburg, MS 39180	FTS 542-2209 601-634-2209
(b) Soil Stabilization	Alfred H. Joseph	USA WES	ATTN: WESGI P. O. Box 631 Vicksburg, MS 39180	FTS 542-2209 601-634-2209
(c) Material Performance Characteristics in Maintenance and Repair Pavements	Alfred H. Joseph	USA WES	ATTN: WESGI P. O. Box 631 Vicksburg, MS 39180	FTS 542-2209 601-634-2209
(d) Remote Sensing	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 39180	FTS 542-2683 601-634-2683
	Jack Jarman	WRSC-C	Kingman Building Fort Belvoir, VA 22060	202-325-0670
(e) Perimeter Security	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 39180	FTS 542-2683 601-634-2683

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4. SPECIAL STUDIES & SURVEYS				
(f) Camouflage	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 3918	FTS 542-2683 601-634-2683
(g) Location of Roof Leaks	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 39180	FTS 542-2683 601-634-2683
(h) Endangered Species	C. J. Kirby	USA WES	ATTN: WESER P. O. Box 631 Vicksburg, MS 39180	FTS 542-3456 601-634-3456
(i) Erosion Control	B. O. Benn	USA WES	ATTN: WESEN P. O. Box 631 Vicksburg, MS 39180	FTS 542-2683 601-634-2683
(j) Power Plant Inspections	Steve Jones	FESA-T	FESA Fort Belvoir, VA 22060	AV 354-6463 703-664-6463
(k) Location of Underground Heat Distribution Pipes	Commander/Director	FESA-HQ	FESA Fort Belvoir, VA 22060	

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4. SPECIAL STUDIES & SURVEYS				
(l) Load and Power Factor Analysis	S. Aggarwal	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6467 703-664-6467
(m) Circuit Breakers and Protective Devices	Commander/Director	FESA-HQ	FESA Fort Belvoir, VA 22060	
(n) Systems Short-Circuit Analyses and Protective Devices Coordination Studies	Ahto Kivi	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6467 703-664-6467
(o) J-SIIDS	Commander/Director	FESA-HQ	FESA Fort Belvoir, VA 22060	
(p) Electrical System IR Survey	Fred Meiswinkel	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6466 703 664-6466
(q) Corrosion Control and Inspection Survey	Malcolm McLeod	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6463 703-664-6463

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
4. SPECIAL STUDIES & SURVEYS				
(r) Electrical Systems: General Troubleshooting and Failure Investigations	Allan Kiisk	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6461 703-664-6461
(s) Metering	Commander/Director	FESA-HQ	FESA Fort Belvoir, VA 22060	
(t) Mechanical Systems: General Troubleshooting and Failure Investigations	O. K. Soward	FESA-M	FESA Fort Belvoir, VA 22060	AV 354-5245 703-664-5245
(u) Presentations of Energy Seminars, Workshops, and Conferences	Don Fournier	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6467 703-664-6467
(v) Energy Control Systems	Dr. Harold Hollis	FESA-T	FESA Fort Belvoir, VA 22060	AV 354-5510 703 664-5510
(w) Evaluation of Total and Selective Energy Systems	Commander/Director	FESA-HQ	FESA Fort Belvoir, VA 22060	

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(x) Energy Conservations Assistance and Ideas	Dr. Harold Hollis	FESA-T	FESA Fort Belvoir, VA 22060	AV 354-5510 703-664-5510
(y) Building Load Estimating Computer Programs	Commander/Director	FESA	FESA Fort Belvoir, VA 22060	
(z) IR Inspection of Insulated, Flat, Build-Up Roofs for Leaks	A. Knehans	FESA-E	FESA Fort Belvoir, VA 22060	AV 354-6672 703-664-6672
(aa) Thermal Energy Storage	G. Phetteplace or V. Lunardini	USACRREL/EA	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(bb) Window Performance Under Cold Weather Conditions	Wayne Tobiasson Steve Marshall Alan Greatorex	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(cc) Heat Loss Measurement	Steve Flanders Wayne Tobiasson Steve Marshall	USACRREL/EC USACRREL/RP	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
4. SPECIAL STUDIES AND SURVEYS				
(dd) Roofs	Wayne Tobiasson or Charles Korhonen	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(ee) Central Heat Distribution Systems	G. Phetteplace or V. Lunardini	USACRREL/EA	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(ff) Heat Pump Systems	G. Phetteplace or V. Lunardini	USACRREL/EA	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(gg) Natural Resources Management	Dr. Harold Balbach	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7299 217-352-6511 Ext. 299
(hh) Water Management	Dr. Ed Smith	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7262 217-352-6511 Ext. 217
(ii) Waste Water Management	Dr. Ed Smith	CERL-EN	P. O. Box 4005 Champaign, IL 61820	FTS 958-7262 217-352-6511 Ext. 217

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
4. SPECIAL STUDIES AND SURVEYS				
(jj) Resource Allocation	Mike O'Connor	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7204 217-352-6511 Ext. 204
(kk) Management Consulting	Mike O'Connor	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7204 217-352-6511 Ext. 204
(ll) On Site Operations Support Management	Mike O'Conner	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7204 217-352-6511 Ext. 204
(mm) Engineer Support to Military Operations	Commander/Tech Dir	USA ESC	6500 Brookes Lane Washington, DC 20315	AV 292-2950 202-282-2950
(nn) Program Evaluation	Commander/Tech Dir	USA ESC	6500 Brookes Lane Washington, DC 20315	AV 292-2950 202-282-2950
(oo) Energy Conservation and Analysis Center	Commander/Director	FESA	FESA Fort Belvoir, VA 22060	

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
4. SPECIAL STUDIES AND SURVEYS				
(pp) Insulation and Vapor Barriers	Wayne Tobiasson or Steve Flanders	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(qq) Water Resources Planning	James R. Hanchey	IWR	Kingman Building Fort Belvoir, VA 22060	202-325-7420
(rr) Special Studies in Water Resources Planning	James R. Hanchey	IWR	Kingman Building Fort Belvoir, VA 22060	202-325-7420
(ss) Transportation Planning and Analysis	Frank M. Sharp	IWR	Kingman Building Fort Belvoir, VA 22060	202-325-0574
(tt) Water Resource Policy Studies	Commander/Director	IWR	Kingman Building Fort Belvoir, VA 22060	202-325-7420
(uu) Product Testing and Evaluation	Commander/Director	FESA	FESA Fort Belvoir, VA 22060	

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
5. UTILITY SERVICES				
(a) HVAC Systems Assistance	Steve Jones	FESA-T	FESA Fort Belvoir, VA 22060	AV 354-5510 703-664-5510
(b) Disposal of Toxic Hazardous Wastes	A. J. Green	USA WES	ATTN: WESEE P. O. Box 631 Vicksburg, MS 39180	FTS 542-2408 601-634-2409
(c) Water Treatment and Supply	Robert Sletten John Bouzoun Sherwood Reed C. James Martel	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(d) Sewage Treatment and Disposal	John Bouzoun C. James Martel Sherwood Reed Robert Sletten	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(e) Land Treatment of Wastewater	C. James Martel Sherwood Reed Robert Sletten John Bouzoun	USACRREL/EC	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
	Charles R. Lee	USA WES	ATTN: WESES P. O. Box 631 Vicksburg, MS 39180	FTS 542-3585 601-634-3585

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
6. EMERGENCY SERVICES				
(a) Provide Emergency or Stand-By Power	O. K. Soward	FESA-M	FESA Fort Belvoir, VA 22060	AV 354-5245 703-664-5245
(b) Snow Roads and Runways	G. Abele	USACRREL/EA	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200
(c) Snow and Ice on Roads and Airfields	Dave Minsk	USACRREL/EA	Hanover, NH 03755	AV 684-3400 FTS 834-7585 603-643-3200

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7. ADMINISTRATIVE SERVICES				
(a) Revolving Fund & Plant Replacement & Improvement Program	Constantine N. Mandragos David Merkle (Alternate)	WRSC-DP	Kingman Building Fort Belvoir, VA 22060	202-325-0537

Support Function	Name of Consultant	Symbol/ Organization	Address	Telephone
8. INSTALLATION PROJECT FINANCIAL MANAGEMENT				
(a) Management Analysis	Commander/Tech Dir	USA ESC	6500 Brookes Lane Washington, DC 20315	AV 292-2950 202-282-2950
(b) Research in Systems Building Economics	Gordon Bagby	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7203 217-352-6511 Ext. 203
(c) Support Management Engineering - O & M Facilities	Dave Brown	CERL-FS	P. O. Box 4005 Champaign, IL 61820	FTS 958-7273 217-352-6511 Ext. 273

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